THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CVII. No. 2412.] LONDON, AUGUST 3, 1909. [61ST YEAR. PRICE 6d.

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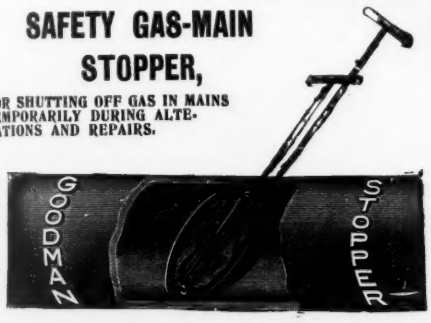

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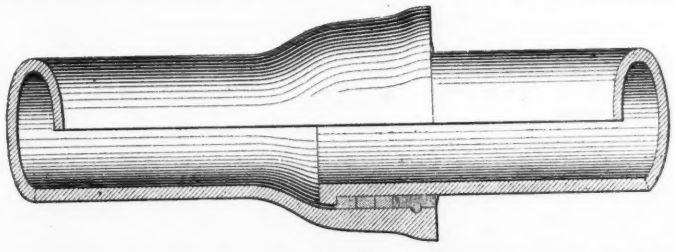

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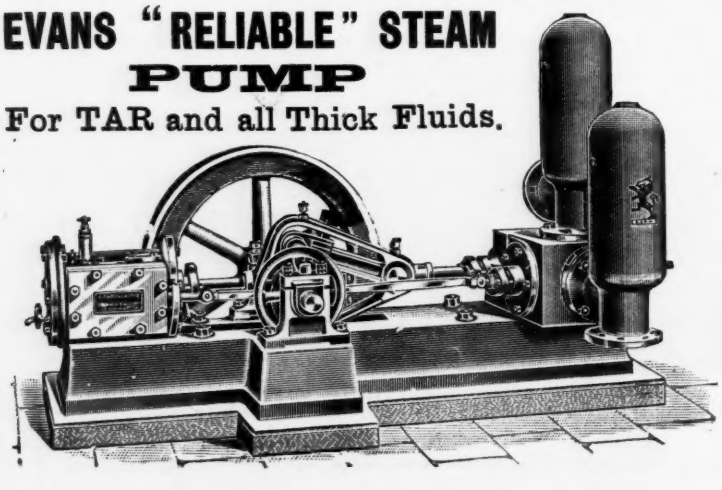

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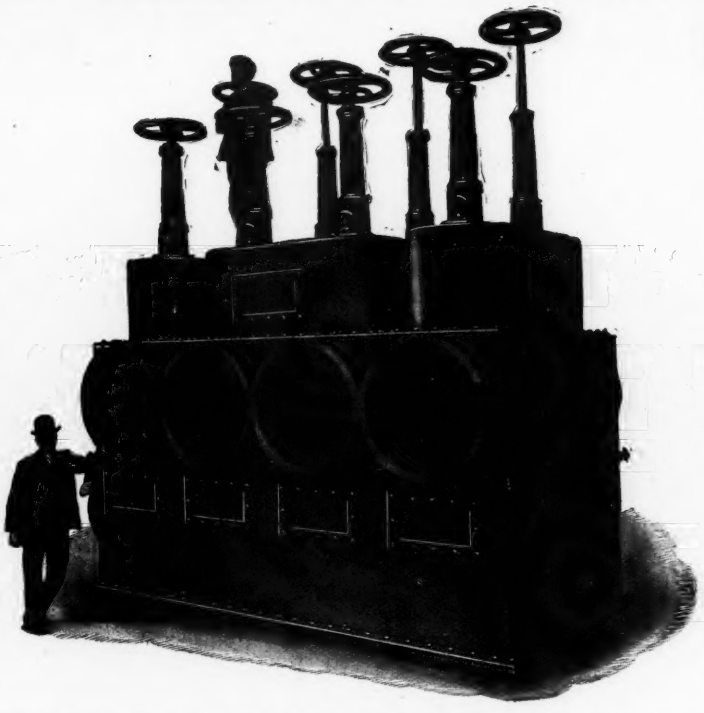

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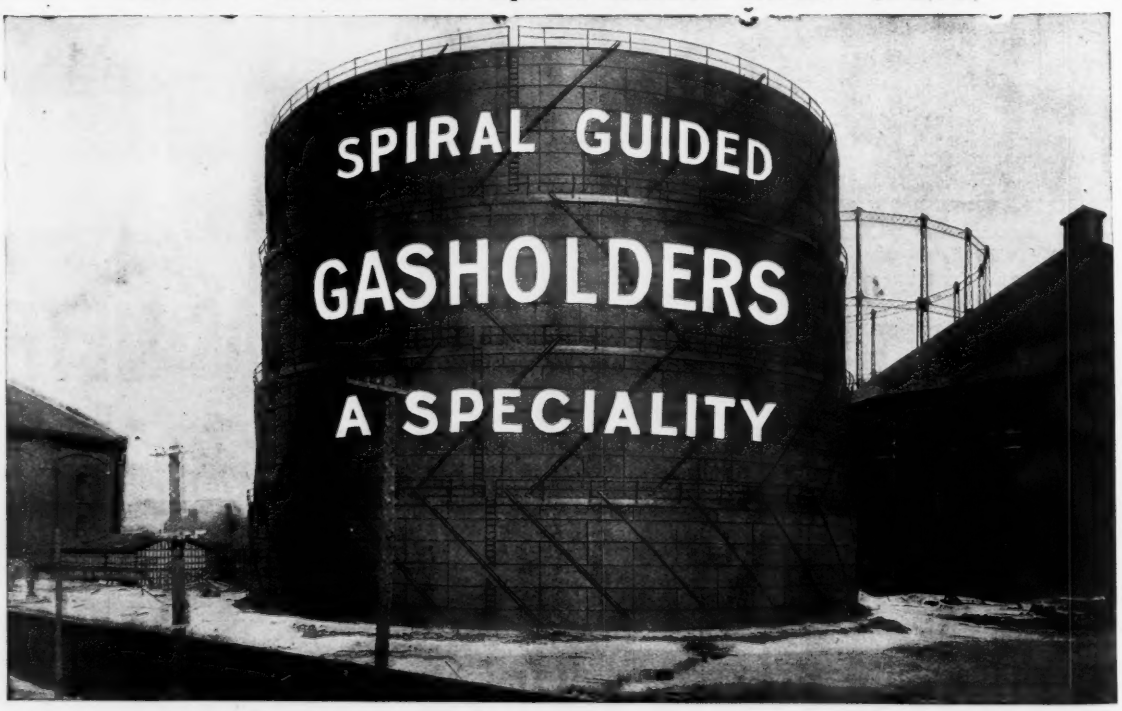

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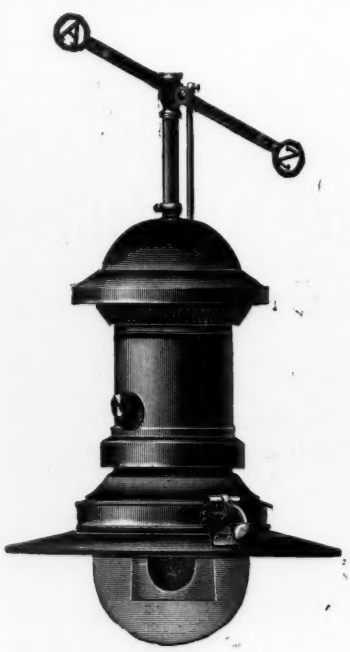

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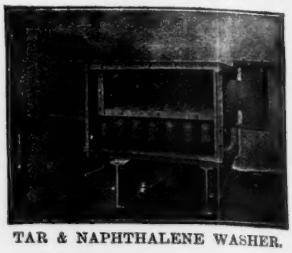

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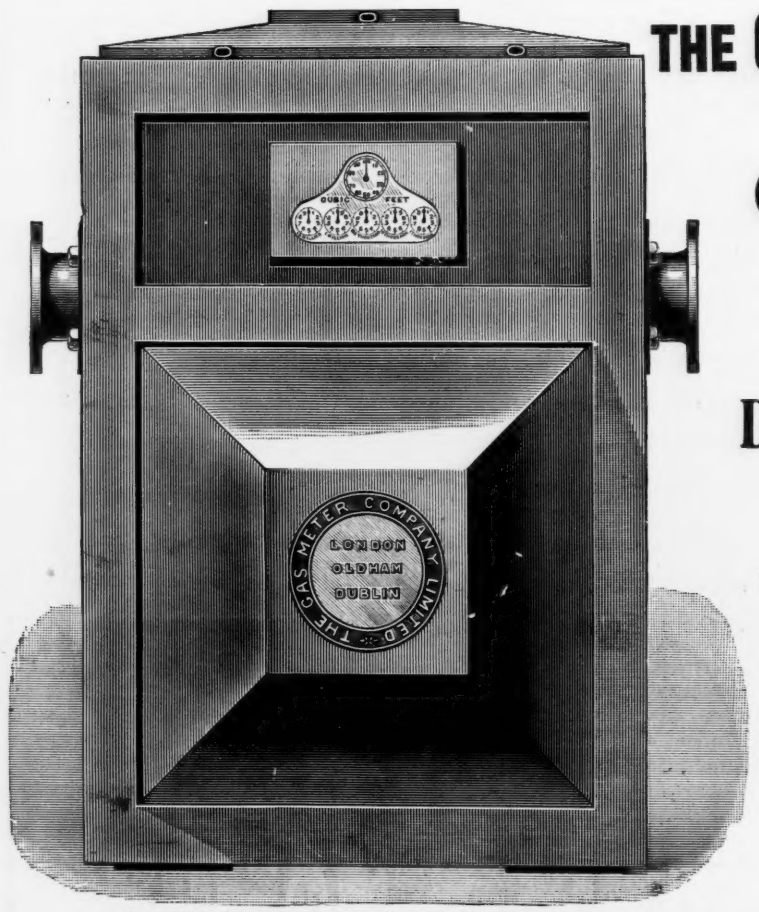

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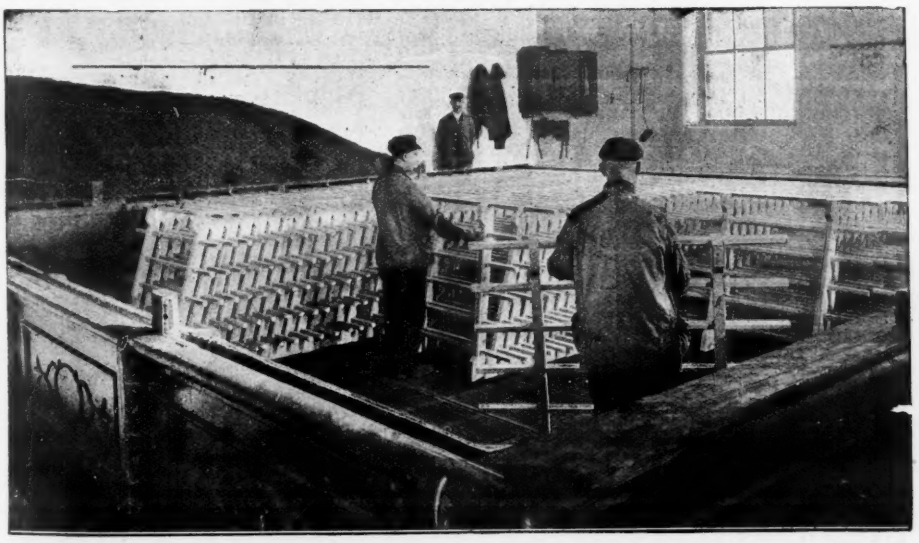
The very best Patent Grid on the Market for Holding Oxide Lightly.

IT IS THE FIRST AND THE ORIGINAL DEEP GRID INVENTED.



It is acknowledged by all the leading Gas Managers, that breaking up the Material, and suspending same in the Purifier as it were is the most practical of any system yet made used of.

These Grids are being more extensively used and more successful than ever, not only in this Country, but we are sending a good many Orders abroad. Also we have installed at a certain Works 20 Sets, 5 repeat Orders of 4 Sets each, and at several other places 3 and 4 repeat Orders of 4 Sets each.

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The Hurdle Grids save their cost in less than 3 Years, and they can be fitted to any kind of Purifier.

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Bath	1,000,000
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Brussels—Forest	1,000,000
Brussels—Koekelberg	1,000,000
Brussels—St. Gilles	1,000,000
Brussels—St. Josse	1,000,000
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Chorley	300,000
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Commercial (2nd)	850,000
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Coventry (2nd)	600,000
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Cracow (2nd)	200,000
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Croydon (3rd)	625,000
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Maidenhead (2nd)	225,000
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Manchester (2nd)	3,500,000
Marlborough	100,000
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North Middlesex (2nd)	200,000
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Norwich (3rd)	500,000
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Redhill (2nd)	300,000
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Reichenberg (2nd)	200,000
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Rhymney Valley	175,000
Romford	300,000
Romford (2nd)	350,000
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Rotterdam (2nd)	1,500,000
Rotterdam (3rd)	750,000
Rotterdam (4th)	750,000
Rotterdam (5th)	600,000
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Shanghai (2nd)	225,000
Shanghai (3rd)	1,600,000
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Southampton (2nd)	500,000
Southampton (3rd)	600,000
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Southport (2nd)	900,000
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Stockholm	1,500,000
Stockholm (2nd)	1,750,000
Stockport	600,000
Stockport (2nd)	600,000
Stockport (3rd)	400,000
Stockton-on-Tees	500,000
Swansea	750,000
Swansea (2nd)	1,000,000
Swansea (3rd)	450,000
Swindon	300,000
Sydney—Harbour	500,000
Sydney—Harbour (2nd)	500,000
Sydney—Mortlake	500,000
Sydney—Mortlake (2nd)	500,000
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Taunton (2nd)	350,000
The Hague Holland	1,000,000
The Hague (2nd)	500,000
Tilburg, Holland	400,000
Torquay	350,000
Tottenham	750,000
Tottenham (2nd)	750,000
Tottenham (3rd)	350,000
Tottenham (4th)	1,000,000
Tottenham (5th)	1,000,000
Tottenham (6th)	1,250,000
Tunbridge Wells	1,000,000
Utrecht, Holland	1,000,000
Utrecht (2nd)	1,000,000
Verviers, Belgium	1,000,000
Vienna	3,500,000
Vienna (2nd)	2,500,000
Waltham	400,000
Wandsworth & Putney	1,800,000
Watford	300,000
Watford (2nd)	350,000
Wellington, N.Z.	350,000
West Bromwich	550,000
West Ham	1,500,000
West Ham (2nd)	800,000
Weston-super-Mare	350,000
Weston (2nd)	350,000
Wexford, Ireland	100,000
Wiesbaden, Germany	850,000
Winchester	225,000
Winchester (2nd)	125,000
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Zwolle, Holland	200,000
Zwolle (2nd)	200,000

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EDITORIAL NOTES.

GAS, &c.—
- Gaslight Finance and Working 295
- Financial Effects from the Retort-House . 296
- Old Practices and New. 296
- The Parade of the Miners' Power . . . 298
- A Co-Partnership Suggestion. 298
- Daylight Saving Bill—Gas Matters in Manchester—Some Interesting Figures—The Definition of a "Trade Dispute" . . 299

Gas Stock and Share Market 300
Electricity Supply Memoranda. 300
Electrical Discourtesy 301
Personal. 301
Gaslight and Coke Company—Half-Yearly Report 302
South Metropolitan Gas Company—Half-Yearly Report 302
Weighing Cargoes of Coal and other Material 302
Fifty Years of American Gas Journalism . . 303
Quality of London Gas 304
North British Association of Gas Managers—Annual Meeting in Stirling—
- General Business 306
- Inaugural Address of Mr. James D. Smith 307
- Mr. S. Milne on the Installation of Carburetted Water Gas at Aberdeen . . . 316
- Mr. W. Wilson on the Latest Practice in Horizontal Retort Settings at Falkirk . 321
- Mr. A. Waddell on the Working Efficiency of High-Pressure Gas Plant at Dunfermline 325

Hefner and Harcourt Lamps Compared . . 312
Indicating of Gas-Engines 312
First Installation of Dessau Vertical Retorts in the United States 313
A New Lock for Slot-Meter Money-Boxes . 315
The "H.B." Patent Pump-Valve 323
Ignition Temperatures of Gases 323
Analysis of Gaseous Mixtures 327

PARLIAMENTARY INTELLIGENCE.

Progress of Bills 331
Protection of Water Supplies 331

REGISTER OF PATENTS.

Incandescent Gas Lamps and Burners—Helps, G.. 327
"Twin" Incandescent Gas-Lamps—Eddrup, E. C. P., Boughton, H. F., and Everson, W. H.. 327
Retorts for the Destructive Distillation of Coal or other Carbonaceous Substance—"Coalite Process"—Parker, T.. . . . 328
Closing the Doors of Retort Stills—Parker, T. 328
Manufacturing Producer or Water Gas—Pettibone, H. 328
Intermittently Illuminated Gas Signs—Ullrich, R. 329
Gas-Controlling Apparatus—Sieben, H. . . 329
Prepayment Gas-Meters with Differential Wheel Gear—Ketterer, F. 329
Intermittent Gas-Lighting Burner—Société Clerc-Bidault et Cie. 329
Attaching Incandescent Mantles to Mantle Rings—Skriwan, E. 330
Applications for Letters Patent. 330

MISCELLANEOUS NEWS.

The Success of Co-Partnership—South Metropolitan and South Suburban Companies' Schemes 332
Electric Street Lighting in Maidstone. . . 333
Gaslight and Coke Company's Accounts . . 334
South Metropolitan Gas Company's Accounts 334
Brentford Gas Company—Half-Yearly Report and Accounts 335
South Suburban Gas Company—Half-Yearly Report and Accounts 335
Tottenham and Edmonton Gas Company—Half-Yearly Report and Accounts . . . 336
Manchester Corporation Gas Undertaking—Annual Report and Accounts. 336
Halifax Corporation Gas Accounts . . . 337
Barry Gas and Water Undertakings . . . 337
Completion of the Carlisle Water Scheme . 338
Notes from Scotland 338
Current Sales of Gas Products 339
Coal Trade Reports 340
Gas Stock and Share List 341

CORRESPONDENCE.

Livesey Memorial Fund 330
The German Experiments with "Flicker" Photometers 330
"Electricity for Everybody" 330
Retort-House Work—Light *v.* Heavy Charges 331

LEGAL INTELLIGENCE.

Water-Rate for Unoccupied Premises. . . . 331
Charge for Water and Meters at Portishead . 331
Laindon and District Gaslight, Water, and Coke Company, Limited—Thefts from Prepayment Gas-Meters by a Boy—Dispute as to the Registration of a Meter—Acetylene Explosion in a Mine 331

PARAGRAPHS.

The Bury St. Edmond's Managership . . . 301
Tests of Filter Sands 304
Subways in the City of London—Exhibition of Processes for Making Gas for Balloons—The Margate Appointment 311
Absorption of Sulphur by Wall Plaster . . 322
Gas Companies' Accounts for 1908—Coal-Tar Dyestuffs in the United States . . . 324
Presentation to a Cardiff Gas-Works Official—The Calorific Power Test for Coal Gas—Specification for Standard Cast-Iron Pipes 327
Brighouse Gas Undertaking—Death from Gas Poisoning. 330
Incandescent Gas Lighting in Lambeth . . 336
Huddersfield and the Longwood Gas-Works 331
Reduction in Price at Bath—Improperly Using Gas 337
Meter-Testing at Coventry—Public Lighting of Westminster 339
Schultz, Comins, and Co., a Dissolution of Partnership—Profit Sharing in the New Haven (Conn.) Gas Company 340
Bermondsey Explosion—Sales of Stocks and Shares—Proposed Improvement of the Plymouth Water-Works—Reduction in Price by the South Suburban Gas Company—Melbourne Metropolitan Gas Company—Crowthorne Public Lighting—Reduced Charge for Public Lighting at Lewisham—Charge for Public Light in Hanley . . . 341

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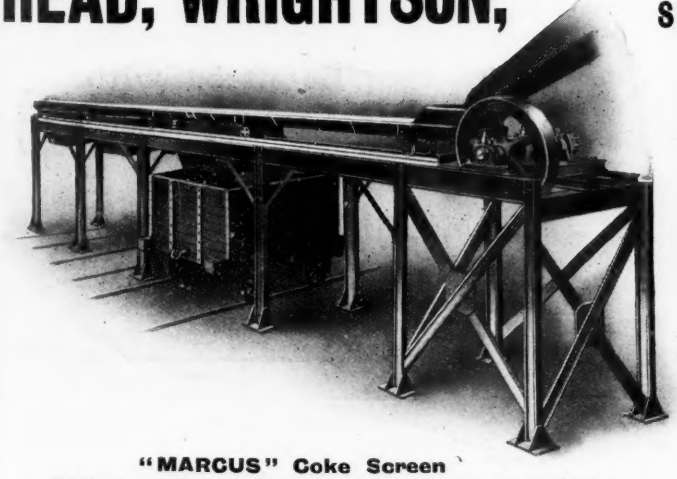

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EDITORIAL NOTES—GAS, &c.

Gaslight Finance and Working.

THERE has never been a half-year's financial and working statement in the whole history of the Gaslight and Coke Company that has given us greater pleasure to review (if we except the residuals section of the accounts) than that to hand for the past half year. We think it will be found that, despite bad trade and industrial depression, gas undertakings generally have not done at all badly in their financial results in the past half year; but the accounts that have been issued within the past few days from Horseferry Road are on their face, and more so on critical comparative examination, remarkable in more senses than one. We are glad of this—and we think all concerned will be, in the circumstances of the six months, proud of the fact—because it is the opening half year in the history of the undertaking as a co-partnership concern; and for the first time, therefore, charges appear in the accounts on behalf of the army of workers, which confer upon them (or rather upon the 8000 officers and workmen who have given their adherence to the scheme) a share, beyond mere defined salary and wages, in the prosperity of the concern. In view of this, workers, as well as proprietors and consumers, have to be congratulated on the financial position as disclosed by the accounts.

It is seen that, after setting aside £10,000 towards the redemption fund, and making a special contribution of £27,077 to the co-partnership fund, there remains a balance on the half-year's working of £339,872. The balance on the corresponding half year, however, was £406,434, after setting aside £10,000 to redemption fund and £10,000 to the insurance fund, the last named of which items there is no necessity to provide for in the present accounts, in view of the facts that claims on the fund are *nil*, and that a substantial amount already stands to its credit. But it is in comparing the balances of £406,434 and £339,872—showing a reduction of £66,562—that without care error will be committed. It has to be taken into consideration that during the past half year the price of gas has been 1d. per 1000 cubic feet less than in the corresponding period; and as the Governor (Mr. Corbet Woodall) calculates a penny reduction as representing, in round figures, £80,000 a year, it means that consumers contributed to the revenue something like £40,000 less in the past six months than they would otherwise have done. Adding to this £40,000, the special contribution of £27,077 for the co-partnership fund, and the co-partnership charge in the revenue account of £11,605 for the half year, it is seen that the decrease of the balance on the period's trading is much more than accounted for. But in these total financial figures there is more ground over which to write in a congratulatory vein. The balance brought forward from the previous half year being £423,324, there is an amount available for distribution of £763,196, against £755,984 in the corresponding period of last year. Out of the £763,196, the Directors recommend a dividend on the ordinary stock of £4 13s. 4d., which is an increase of 2s. 8d. per cent. on the corresponding half of last year, and this 2s. 8d. will absorb nearly £10,000 more. Nevertheless, the sum to be carried forward (£409,893) will be only £2405 less than a twelvemonth ago. This is all excellent, considering the provision for the co-partnership workers, the £40,000 given to the consumers in reduction of the price of gas, and the £10,000 increase required for the dividend. There we have the Co-Partnership trinity represented, and shown sharing in the Company's prosperity. It is in the cause of the security of this trinity, that there is so much activity in administrative enterprise.

In the making of the revenue account, the lower cost of materials came largely to the aid of the Company; but, even so, owing to the depressed state of the residuals market, the savings in the raw materials of gas manufacture do not, by £14,247, counterbalance the lessened income from residuals. But there is to be a further saving in the cost of raw materials in the current year; contracts having been entered into by the Directors for both coal and oil at prices lower than those paid during last year. In the half year, coal cost £583,697, or £78,502 less than in the corresponding period of 1908. This, however, was not all saving due to cost, inasmuch as the 849,875 tons carbonized was less by 46,493 tons than in the first half of last year. On the other hand, the £87,277 spent for oil was £4745 more, which indicates a larger make of carburetted water gas; the 7,723,826 gallons of oil and 111,911 gallons of spirit used representing increases respectively of 865,862 and 53,051 gallons. The coke and breeze consumed in the half year, costing £32,655, represented a decline of £5025; so that whatever the increased make of carburetted water gas, in the total it cost less than a twelvemonth ago. Wages and purification exhibited decreases; and an expenditure of £175,127 on repairs and maintenance of works and plant was a reduction of £8722. The total of the manufacturing charges (£996,851) was less by £98,464. But in the distribution department, the expenses have gone up in every item, excepting fittings for prepayment meter supplies; so that the expenditure in this department is higher in the total of £243,420 by £13,405. From this it will be gathered that, taking the whole undertaking through, the aggregate charges for repairs and maintenance have been well sustained. While mentioning this matter, an incidental reference may be made to the capital account, in which it is observed that, whereas the capital expenditure in the half year amounted to £45,213, there was a total deduction of £47,867, whereof £46,209 was in respect of depreciation of plant, meters, and stoves, and £1658 in respect of sale of surplus land. Reverting to the revenue account, there are few other items of interest on the expenditure side; the fluctuations being of small amount. Rates and taxes figure at £141,898; being an increase of £3433. There is the new charge for co-partnership of £11,605. Parliamentary costs are up by about £1000; this, it may be taken, being on account of the Bill now before Parliament, for, *inter alia*, the annexation of the West Ham Company and the reduction of illuminating power. Bad debts reach £9681 on this occasion; being £2175 more. The final result is that the total expenditure (£1,510,895) is down by £63,464.

The decrease in the half-year's disbursements reflects principally the improved conditions for the purchase of materials; the revenue side of the account reflects the downward course of coke in sympathy with coal, and the effects of trade depression in the sales of gas and residuals generally. In considering that the receipts for gas sold (£1,528,376) represent a fall of £29,274, the penny reduction—the equal of about £40,000—must not be forgotten. As a matter of fact, there was an increase of ¾ per cent. in the sale of gas; so that the decrease in the corresponding half of 1908 of ½ per cent. has been more than recouped. In volume, the sale of gas was 78,431,000 cubic feet more; the total having been 11,247,529,000 cubic feet. Taking the half year through, the atmospherical conditions—so frequently damp and cold—were not unfavourable to the sale of gas for domestic purposes. But, on the other hand, the stagnation in trade must have depressed consumption in several directions. The rental of ordinary meters was slightly lower; but there was an increase in stove-rental of £2430, and in fittings rental of £7548. The number of additional consumers connected up in the half year was 10,236; and the further gas-stoves sold and let on hire totalled to 15,387. The only cheerless part of the accounts is found in the receipts for residuals. They are in every branch consistent in presenting relapses. Coke fetched £248,811, a decline of £78,983; breeze £16,215, a decline of £5169; tar and tar products, £48,301, a decline of £3854; and ammoniacal liquor and sulphate of ammonia £92,606, a decline of £5024. These recessions in residuals income amount to £93,029; the total receipts from the department

being £405,934. The receipts from all sources amount to £2,083,496, or a decrease of £112,646, the greater part of which is, as seen, due to residuals. But of this, expenditure has saved £63,464, notwithstanding the £11,605 charged for co-partnership. Therefore the amount carried to the net revenue account, £572,600, is £49,183 less. Having regard to the trading conditions of the half year, the depression in the residuals market, the reduction in the price of gas, and the new charge for co-partnership, that the final difference on revenue account is not larger than it is is a matter for congratulation; and the fact that, though so much has been done, the carry-forward is only less by under £2500, is really, under the circumstances, a remarkable showing.

Financial Effects from the Retort-House.

When the proprietors of the South Metropolitan Gas Company meet the Chairman (Mr. Charles Carpenter) and his colleagues of the Board and officers to-morrow week, it will be their duty to express admiration for the accounts on the score that, financially, administration and working have totally annihilated the bad effect that the depressed condition of the residuals market has had upon income, to the end that the full sliding-scale dividend of £5 6s. 8d. per cent. can be paid, and yet leave a carry-forward of £66,726, though only a balance of £7371 was brought into the half year. This is highly satisfactory. But were it not that the expenditure under the heading of manufacture of gas calls for reference, and that the residuals receipts show some material changes, it would be possible to say that the accounts in other respects present such a striking similarity to those for the corresponding period of last year that comment is superfluous.

In the "Journal" for July 13, a letter appeared from the Chairman, which announced that he was a convert to the use of heavy charges in horizontal retorts. That letter may be read in conjunction with a statement in the Directors' report that there has been a saving of 30,000 tons of coal in the half year, due to improved gas-making methods. As a matter of fact, the total quantity of coal carbonized amounted to 570,075 tons, or a decrease of 32,234 tons; but a minor part of this is due to the 9 million cubic feet less gas sold, on a total sale of 6,286,736,000 cubic feet. The price of the coal, too, was somewhat lower; but the saving of 30,000 tons of coal, and the reduction of £71,491 in the total manufacturing expenses (£539,097), give us the supplement to Mr. Carpenter's letter, and at once put us in possession of the direction in which there is indebtedness for the improved financial result in a half year when residual products have done their best to cast a cloud over the trading. In no part is the considerable diminution in manufacturing costs attributable to a reduction of the item of repairs and maintenance of works and plant, seeing that the outlay under this head (£96,818) is £1047 more than in the corresponding half of last year. The two main items in the manufacturing expenses in which there have been decreases are in coal and carbonizing wages. The former, costing £368,695, is less by £63,375; and the latter, requiring £51,109, is lower by £6550. While mentioning the £63,375 reduction in the cost of coal, it is of interest to examine the relation that this bears to the lower receipts for residuals, in view of the fact that the report tells us that the saving in the cost of coal has been more than counterbalanced by the loss on coke and breeze. This we take to mean the cost on the quantity purchased, and not calculating that part of the saving due to the smaller quantity of coal required owing to the improved manufacturing results, which enabled 11,027 cubic feet of gas to be sold per ton of coal carbonized, which is the highest point attained in the history of the Company. The total receipts for residuals amounted to £249,410—a diminution on the accounts for the corresponding half year of £53,256, which was made up by the income from coke being £152,706, or £39,439 less; from breeze £4722, or £4498 less; from sulphate of ammonia £57,599, or £10,235 less; while the item of tar and tar products, yielding £34,382, was £917 more—the requirements for timber preservation having helped to maintain the average value of the tar products. Therefore it is seen that improved results from works, supplemented by the lower cost of coal, was more than equal to the diminished income from residuals.

Returning to the expenditure for the half year, the items of distribution vary up and down, with the final result that the £132,640 spent in this department represents an increase of £13,091. This is partly due to the additional facilities the Company are providing in the way of district offices and show-rooms; and they are proceeding with their water-slide chandelier conversion work to such an extent that no less than 20,000 have been dealt with since last Christmas. The attention that the Company give to the consumers, the facilities they afford for cheap repair and renovation of private fittings, and the free cleaning of gas-fires (including the supplementing of the ball fuel), we know, by independent testimony from various quarters, is very much appreciated. Rates and taxes amount to £45,608; being an increase of £3680. Included in the management expenses is the £2000 contribution by the Company to the Livesey Memorial Fund, and which contribution received the cordial endorsement of the proprietors at the last meeting. Slot meters are still an attraction to those who do not make any nice distinction between *meum et tuum*; but it is observed that the number of 5417 meters violated during the six months is smaller by 898 than in the corresponding period of last year. The total expenditure was £791,467, which is a reduction of £60,979—thanks to the manufacturing department.

On the revenue side of the account, it is seen that the sale of gas has been almost stationary—in fact, it receded slightly. The receipts from private consumers amount to £680,060, or £4920 less; while in the income of £17,485 for public lighting, there is an increase of from £300 to £400. From the profit point of view, the extra quantity of gas sold per ton of coal carbonized had a much greater salutary effect than the small retrogression in receipts has a detrimental effect. The Directors do not on this occasion explain the causes of this practically stationary condition; but they are doubtless chiefly due to the reasons described six months ago—the migration of residents farther afield, empty houses, and the inverted incandescent burner, not overlooking the bad trading history of recent times. It is not that the price of gas is high—it has been at 2s. 3d., and is now down at 2s. 2d.; and this reduction should assist in stimulating demand. To set against the stagnant condition of the gas sales in the half year, there are material increases in the number of the outlets for consumption. The meters connected now total to 341,359, an increase of 8413; ordinary stoves to 77,778, an increase of 1561; slot stoves to 191,550, an increase of 6905; and gas-fires to 23,582, an increase of 1451. The stove and meter rental on the half year (£67,999) is up by £1740; but the inflow from residuals, as already explained, is £53,256 less. The total receipts (including a new item of gas-fittings, £37,401) amounted to £1,053,958, which is a reduction of £18,777. Now if we deduct this from the lessened outlay of £60,979, there is a balance of £42,202, which is the sum by which the amount to be carried to net revenue account—£262,490—is higher than the sum transferred at the close of the corresponding period of 1908.

That is, in brief, the financial and working history of the Company for the half year; and it has its interesting and satisfactory features for the proprietors, and its lessons for gas engineers. On the indorsement of the accounts, there is no mention of a Chief Engineer. The blank will soon be occupied by the name of Mr. W. Doig Gibb, to whom, we have confidence in saying, the proprietors will extend a most cordial welcome.

Old Practices and New.

"In all ages, and at all times, in affairs of State, as well "as in the simpler affairs of every-day business and social "life, it has often been found necessary to ring down the "curtain upon old and familiar, though decadent scenes, "that it may be again raised to display new scenes better "fitted to the times, and modern in form as well as in "spirit." These were the words with which Mr. James D. Smith (of Stirling) concluded his Presidential Address last Thursday to the North British Association of Gas Managers. The spirit of the words appeared to permeate the whole of the proceedings at the meeting. We find ourselves, too, in reviewing the address and the papers submitted, doing so with the depth of meaning conveyed in the words directing our thoughts. Going at once to the address, the President, with little prelude, deals with the changes, which spell gain, in connection with coal carbonization for gas production. The advances of knowledge and the claims of the times have made it imperative that the curtain (as the President picturesquely puts it) should be rung down on old and familiar practices, and that it should be raised again on newer practices; and nowhere is this more true than in

Scotland, where, as is declared in the address, an old order of things is largely still indulged and tolerated, in spite of the developments that have made much of that old order of things redundant, inconsistent, and an impediment. But that is only true in places in Scotland, and as affecting a part of gas practices.

In the matter of carbonization, for instance, within the limits of opportunity, in several works the other side of the Tweed—apart from the two largest concerns east and west—there is practice that ranks with the very best. This is so at Stirling—the seat of the President's professional labours. While there is perfect accord with the President in his remark that the problem to-day before an engineer desiring to extend his carbonizing plant is a difficult one, and while there is sympathy with him in his complaint (a complaint that has been made before in these columns) as to the difficulty of compiling the results published from different systems of carbonization in such a manner that their relation shall be on a common level, and that their value may be adequately defined—admitting all this, we look to Stirling, Falkirk, Derby, and dozens of other places in the country, and discover that, difficulties notwithstanding, the modern proceeds of knowledge from the newer systems have spurred engineers into achieving, by small but not unimportant changes of practice, better results from their own existing plants, and, in fact, have directed to the proper way. Because vertical retorts have done much in revealing truth, there is no need to scrap present plant, and turn over to verticals. If verticals still prove themselves the superior of horizontal retorts worked in the light of present-day knowledge, the change-over will come about in the same gradual, but sure, manner that direct-firing has given place to regenerative firing. Looking at what the President himself is doing now with a horizontal bench of retorts, charged by the Toogood projector, it would be little short of madness to think of scrapping his carbonizing plant. He could not afford to do it for any productive gain to be at present obtained over the gains derivable by the current methods of working his own bench. This new bench at Stirling is equipped with all that is most approved in getting the maximum out of the coal in horizontal retorts, and yet Mr. Smith is not obtaining all that he might do, and will do, when a reasonable standard of illuminating power and a reasonable test displace from the pedestal on which they have all too long been exalted conditions that apply to other days. The bench is fitted with a Cowan governor, light seals are used, the mouths of the dip-pipes are turned to almost a knife-edge, and tar-towers are employed, and, accompanying, heavy and long-hour charges are now worked.

And what are the results: A substantial increase of gas is metered per ton of coal; an enhanced illuminating power by 1 or 2 candles is recorded by the photometer; an increased quantity of coke is obtained for sale; an additional quantity of tar (comparatively thin and oily), and a 25 per cent. increase in the yield of ammonia, are recorded. On top of these benefits, stopped pipes and naphthalene troubles are practically *nil*. And there is another point upon which the President did not remark, but it is obvious, and that is the saving of coal for a given make of gas. The President gives figures from which the fact can be deduced that, in the Company's last financial year ending May, the make of gas was equal to 11,069 feet per ton of coal working 8 to 9 cwt. charges of six hours' duration; and, using 0·75 gallon of benzol per ton of coal carbonized, a 20-candle power gas was supplied. Taking the figures in the Board of Trade returns for 1907, it is seen that (we assume the coal was of about the same quality) the make was only 10,360 cubic feet per ton of coal carbonized. The difference in profitable results between the old and the new practices as seen by these figures is considerable; but it does not end there. Since the close of the accounts in May up to July 12, the President, progressive in his investigations, advanced the weight of his charges to from 9 to 10 cwt., with a carbonizing duration of eight hours. His make of gas in this period has been at the rate of 11,789 cubic feet per ton of coal carbonized; and all the other results have likewise exhibited improvement, save one—the exception being that 1·11 gallons of benzol have had to be used per ton of coal to maintain the 20-candle power, or a difference of 0·36 gallon per ton. With the extension of the carbonization period, the President loses somewhat in his tonnage carbonizing capacity, but he saves in coal, and he gains in gas yield and secondary products, and apparently in labour. At any rate, he is well compensated in the financial benefits that accrue for the slightly smaller amount of coal that he can pass through his retorts in a day, owing to the heavier charges and the longer carbonization periods.

From this it is seen that Mr. Smith has, for good and all, rung down the curtain on the old carbonizing practices, and raised it on the new—with advantage; and he looks for a fresh opening by the discontinuance in Scotland of the apotheosis of high illuminating power, and the supplanting of the union-jet by the "Metropolitan" No. 2 burner for testing. He laments the slow progress in this regard in Scotland; but he is himself a disciple of progress, and an advocate for the removal of the handicap that he considers high illuminating power places upon gas undertakings. Recognizing this handicap, the Institution of Gas Engineers have his cordial support in the action they have taken, in conjunction with the Gas Companies' Protection Association, in urging upon the Board of Trade the passing of a General Act to place the testing of gas on a uniform basis throughout the United Kingdom. But better than this, while the President would rather that gas undertakings had complete liberty, and were allowed to base their fortunes solely on the satisfaction rendered to consumers, if test there must be, his favour lies in the direction of a calorific power one, so that the test would have relation to the purposes for which gas is in the present day used.

Gas production questions had quite a large part in the proceedings last week. Of such questions were the groundworks of the papers by Mr. William Wilson, of Falkirk, on "The Latest Practice in Horizontal Retort-Settings," and of Mr. Samuel Milne, on the "Installation of Carburetted "Water-Gas Plant at Aberdeen." In neither of these papers, being descriptions of structural work and plant, is there really anything for criticism. But they will be found extremely useful—both in suggestiveness and in practical assistance. Mr. Wilson is to be complimented upon the cheap extension that he made to his carbonizing plant, on the same ground space, by raising the height of the arches of a retort-bench, so that they would accommodate twelve retorts instead of eight, by which not only was the producing capacity largely increased (Mr. Wilson, by the way, also believes in heavier charges than formerly), but the fuel account was reduced. In the plan adopted by Mr. Wilson, he was fortunate in finding that the pier walls of the settings and the top equipment of the bench were respectively of a strength, character, and capacity that enabled him to make his extension upwards at a minimum of expense. For this he was indebted to the foresight of the late Mr. M'Crae.

Concerning the paper by Mr. Milne, its principal feature lies in the comprehensive description and working of an up-to-date carburetted water-gas plant, of the improved type of the Economical Gas Apparatus Construction Company. The paper was by no means inopportune. We are not sure that the future will not see water-gas plants of the various types take a larger part in the economies of gas production than in the past. They came to us largely for their convenience as the producers of a stable enrichment, and for their "collateral" advantages. Their stand-by value to a gas undertaking has been proved up to the hilt; as enrichers, with the progress of events to the place that gas was destined to occupy in the service of communities, they are losing ground. But their service can be commanded to the very antithesis of their original purpose; and there is little doubt that they will henceforth enter into considerable use in gas-works economies for breaking-down the illuminating power of gas to a point that is all-sufficient under the requirements of present times. Towards the end of his paper, Mr. Milne quotes working results, under the conditions of Aberdeen, which show the critical part that the price of oil plays in the relative costs of carburetted water gas and coal gas. That critical part will be largely eliminated by reducing the quality of the gas produced by the plant. But considering last winter's figures, which exhibit a disadvantage of 0·96d. per 1000 cubic feet as the cost in the holder compared with coal gas, it must not be overlooked that the water gas was of an average illuminating power of 25 candles, while the coal gas was of 20½-candle power. But with a drop in the price of oil of 0·82d. per gallon, the water gas this year will come out to about 13·35d. into the holder, as compared with 16·10d last winter. If, however, Mr. Milne was using his carburetted water gas to break-down his gas to the newly-acquired standard of 15 candles, what then would be the saving effected on the cost of his whole manufacture?

The paper read by Mr. Alex. Waddell, of Dunfermline, is a complete answer to the friendly criticism made last year

of his system for the automatic regulation of a high-pressure supply to a district 144 feet below the level of the gas-works, and extending some 4½ miles away. The credit of an original application that has worked for some months satisfactorily is his. The means of automatic regulation of the initial pressure at the compressor to the requirements of the district served, is by a return ⅜-inch block-tin tube, three miles long, running through the high-pressure main. By means of this tube, the pressure in the area of supply is continuously transmitted to the apparatus governing the speed of the compressor. It was felt that, considering the smallness of the diameter of the tube and its length, friction and deposit might cause irregularities in communication; but with the adjustment of a minor trouble or two, and an improvement in the safety bye-pass valve, everything has worked well; and Mr. Waddell's scheme of automatic regulation has—to date—been fully justified.

The Parade of the Miners' Power.

There was universal relief throughout the country towards the close of last week when the news was received that a national strike of the coal miners had been averted, through the yielding action of the Scotch coal owners—not (so far as the terms of the agreement indicate) from any unbending on the part of the men. But there are still doubts whether the settlement may be taken as ending, even for a time, all occasion for fear of disturbance through disagreement in the coal labour field. What has been transpiring lately shows the restlessness of the miners, and the desire to demonstrate their power in the country. There was a threat by the Miners' Federation to take the sense of the miners of the British Isles as to a general strike at the time of the recent Welsh dispute; and no sooner was this successfully disposed of, than the Federation turned their attention to the one between the Scotch miners and owners. The little northern cloud at once assumed large dimensions. It was also the Miners' Federation who pulled the strings over the Coal Mines (Eight Hours) Act. The arrogant and truculent attitude of the central organization in these recent affairs has made industry more than ever nervous as to the future; and for weeks now the whole country has been disturbed, and wavering between hopes and fears, as one day brighter rays were on the horizon and the next gloom, in the matter of the efforts in negotiation to bring about an amicable understanding between the Scotch owners and miners. In this matter, there has been a striking amount of inflexibility evinced. Under the main issue in the dispute, there are to be seen the movements that are to eventuate in a higher normal price for coal. The masters originally gave notice (within the terms of the 1904 agreement, and therefore they were within their rights) for a reduction in wages of 12½ per cent., to 5s. 6d. a day; while the men held out for 6s. a day being the minimum. As a matter of fact, the principle of a higher irreducible minimum per man per day was the chief issue. The masters' contention was that this could not be, in view of the fall in coal prices, and the heavier costs imposed now by the working of thinner seams, by the Compensation Act, by the Eight Hours Act, and by other causes.

Many conferences were held, there was perseverance in negotiation under the persuasive influence of the Board of Trade, and attempts were made to introduce the other available machinery in the way of arbitration and conciliation (which are good enough in their way, so long as the parties show a plastic disposition) to bring the parties to agreement. But until late last week conferences and negotiations had been in vain. On Friday evening, however, came success. The owners had previously conceded, for the sake of peace and in the interests of the nation, the principle of a fixed minimum of 6s. a day; and the only matters then outstanding were the conditions. Without traversing the details of the concluded agreement, it is sufficient to state that the question of the operation of the fixed minimum is to be subject to the conditions obtaining in the coal trade during the next eight months; and this is to be referred to arbitration—the Conciliation Board being continued, with a neutral Chairman. The agreement will remain in force until Aug. 1, 1912; and six months before that date and onwards, it is subject to termination at six months' notice.

Next to the settlement itself, the great event of the week was the parade of power by the Miners' Federation, which again for a time compassed the whole country with the fear of an almost immediate paralysis through a coal war. The result of the plébiscite that was taken—which gave the number of British miners in favour of a general stoppage in support of the claims of the Scotch miners as 518,361, and against as only 62,980, or about eight to one—shows that here there is a matter of great national gravity. The dispute affected Scotland, but not England; and no sufficient ground was ever shown for the intervention of the English miners. But the fact remains that this immense army of subterranean workers were prepared to make common cause by handing in their notices to stop work in order to bend the Scotch coal owners to the will of the miners, and thus bring disaster and misery on the whole country. This is the army of men whose pitiful powerlessness induced the Government to throw over them their ægis in the shape of the Eight Hours Act! Their power in the country is immense—the very nature of their work gives them peculiar strength; and the recent activities of the Miners' Federation in a militant direction indicate an intention of impressing upon the country and the coal owners the effective force and power that the miners as organized are in the land. However, whatever may be in store, we are thankful for the present peaceful ending, and that a general strike has been averted. But if there had to be a test of strength between the two parties to the dispute, then better now than in the dead of the winter. At any time the miseries produced by a coal war must be deep and keen, and the losses large; but they would be fearfully accentuated when the asperities of winter are upon us.

A Co-Partnership Suggestion.

The day is past when, excepting for the necessary purpose of again and again stimulating interest, there is call for advocacy in the gas industry of the principles and advantages of co-partnership. The principles are sound; and no one dares to assail them. The advantages are real, and in large part tangible. The incentives to the participators in the system are of a character that no other industrial scheme, however near to the borders of co-partnership it may lie, has yet succeeded in shaping and activating. This is being attested daily in the several Gas Companies that have constructed their affairs on the basis of a mutual interest between consumers, proprietors, and workers, after the lead given by Sir George Livesey and the South Metropolitan and the South Suburban Gas Companies. No matter to what co-partnership may come in magnitude, or in revolutionizing the relations of Capital and Labour, the honour of pioneers in, and of discoverers of, the ways to industrial peace can never be removed from those two concerns. The co-partnership dinner of representatives of the two Companies was held last Thursday, under the chairmanship of Mr. Charles Carpenter, with Mr. Charles Hunt in the vice-chair. There are two reasons on this occasion for a special reference to the proceedings. The first is that the question was asked some time since as to what would happen to co-partnership in these Companies when Sir George was removed. The answer is found in the unabated enthusiasm of all—from Chairmen, through chief and subordinate officers, to the rank-and-file of the workers. What has been done cannot now be undone; and where the flag of co-partnership was planted, there it will remain. The other point is a suggestion that fell from Mr. Hunt. The three London Companies are all now working under co-partnership, and on their borders are the South Suburban, the Croydon, and the Tottenham and Edmonton Companies. Before long, too, it may be expected the West Ham men will be brought into the co-partnership ranks through the amalgamation with the Gaslight and Coke Company. In view of London being such a large centre of gas co-partnership, Mr. Hunt hoped that at some future time it might be possible to enlarge the gathering at the Crystal Palace, so as to make it representative of all the co-partnership gas companies in and around London. The idea is not one that is impossible in its consummation. At the Palace there are Police Fête days, Foresters' days, Sunday School, Band of Hope, and Co-operative Festivals; and there is no reason, if desired, why there should not be a Gas Co-Partnership day. One thing is certain, that it would keep the world informed as to what has been, and is being, done in the gas industry in this great social and industrial reform; and it would keep the honour of it all green in the direction in which it rightly rests. Welcome is given by co-partners—selfishness is not one of their traits—to co-partnery in all industries. There is a proneness, however, for the newspapers and the public, in

the newer applications of the principles, to forget that the novelty has long since been worn off, and that the proof of success has been fully established in the gas industry.

Daylight Saving Bill.

It looks as though that hapless measure the Daylight Saving Bill is going to be shelved again this session. The inquiry, examination, and overhauling that the proposal has had to advance the clock on the third Sunday in April and to set it back again on the third Sunday in September, so as to make use of more daylight and less artificial illumination, have been of an order beyond which it would not have been necessary to go for a scheme of a much more momentous and elaborate character. Again this session it has been under investigation by a Select Committee, just as though prior inquiry had not been adequate. Now this Committee cannot agree on a favourable report. The Chairman the other day brought up a draft one favourable to the scheme; but the Committee would not entertain it. Over the matter there is in consequence a sort of deadlock. It may be expected therefore that the measure will be pigeon-holed once more. But those who are piloting the idea are not the people to abandon it. They are enthusiasts of the first water; and after every rebuff and every want of success, they come up smiling with an enlarged army of converts at their backs.

Gas Matters in Manchester.

We are able in to-day's issue to publish our customary summary of the report of the Manchester Corporation Gas Committee, and the accounts of the department, for the year to March 31 last, which we have received from Mr. F. A. Price, who, as readers are aware, recently succeeded Mr. Charles Nickson in the position of Superintendent. Mr. Nickson did not enter upon his well-earned retirement until a few weeks ago, so that the accounts for the past financial year, it may be mentioned, bear his signature as Superintendent. Turning to the report, one feature which will no doubt attract attention is the decrease of 2·41 per cent. in the quantity of gas transmitted from the works, as compared with the previous year. It must, however, be remembered that this decrease follows upon the heels of increases of 3·36 per cent. in 1908, just over 5 per cent. in 1907, and nearly 6½ per cent. in 1906. No doubt, in the past year Manchester has had quite its full share in the depressed conditions of trade by which all our industrial centres have been more or less affected; and the very fact that such satisfactory increases have been recorded of recent years, renders a set-back in times of commercial inactivity the more easily understandable. With the passing away of the clouds which have for some time overshadowed so many of the country's important industries, it may be, with some confidence, predicted that the Manchester Gas Department will go ahead again just in the same manner as it has been accustomed to do in the past.

Some Interesting Figures.

The percentage of unaccounted-for gas on the present occasion, it will be remarked, is somewhat smaller than was the case in the previous year—the figure being 3·24 per cent., against 3·54 per cent. There is recorded an increase in the number of consumers of 3352—the total being 174,290; while the number of prepayment meters fixed at the end of March was 58,041, or an increase of 1673. The amount collected during the year from the prepayment meters was no less than £74,041—represented by 17,769,958 pennies, weighing over 158½ tons. The proportion of the consumers who enjoy the free use of a cooker or griller continues to increase; the figure having now reached 44 per cent. The quantity of gas consumed by cookers in the past twelve months is estimated at the large amount of 613 million cubic feet, or an increase of about 7½ per cent. Engines—the number of which in use shows a slight falling off (which, again, may fairly be attributed to trade conditions)—were responsible for a consumption of some 390½ million cubic feet, or a decrease of 8·33 per cent. The cost of coal, cannel, and oil per ton carbonized shows a further increase on the rise recorded last year—the figure being 11s. 9·14d., against 11s. 4·17d. This increase was responsible for an addition of £10,653 to the cost of the 514,446 tons carbonized. The result of the operations, it may be remarked, is a gross profit of £140,022, as against £165,339; and a net profit of £89,873, compared with £116,181. Of this net profit, £60,000 has been paid over to the city fund in aid of the rates, in place of the previous £50,000; but it will be remembered that the smaller sum is to be contributed from the current year's profits. The income on the present occasion is £761,363, against £782,690 last year; while the expenditure is £621,341, compared with £618,702. For the purposes of the Committee's apportionment, a sum of £42,732 has been transferred from the reserve fund and added to the net profit.

The Definition of a "Trade Dispute."

The House of Lords have lately had before them a case which raised the question of what was intended when drawing up certain words contained in the Trade Disputes Act of 1906. The action, which has now been through the County Court, the King's Bench Division, the Court of Appeal, and the House of Lords, is of interest as affording a striking illustration of the injustice that can be perpetrated by individuals, as well as by organizations, in the name of Trade Unionism. The original plaintiff in the action was in the employment of a certain firm; and in order to compel him to pay a fine, and to punish him for not paying it, the foreman of the firm was induced to dismiss him, by the threat that unless he did so the Union men in the firm's employ would leave off work—which, however, was not true. The plaintiff, therefore, had to leave his work; and in the County Court the Jury awarded him £50 damages—finding that there was no trade dispute existing or contemplated by the men. A new trial was asked for by the defendant (who, though district delegate of his Union, was said to be acting without authority in the threats he uttered), and the Judge refused it, in which he was upheld by the Divisional Court These decisions, however, were reversed by the Court of Appeal on the ground that the action was not maintainable by reason of the Trade Disputes Act, 1906, which provides that "an act done by a person in contemplation or furtherance of a trade dispute shall not be actionable on the ground only that it induces some other person to break a contract of employment, or that it is an interference with business or employment of some other person, or with the right of some other person to dispose of his capital or his labour as he wills." This judgment, in its turn, has been upset by the House of Lords. The Lord Chancellor thought the meaning of the words "an act done in contemplation or furtherance of a trade dispute" was that either a dispute was imminent and the act was done in expectation and with a view to it, or that the dispute was already existing and the act was done in support of one side to it. An act done with a single eye to a dispute "in contemplation or in furtherance" of it, would not be actionable; but this his Lordship did not think applied to a case like the present one, which clearly was a mere attempt to "put the screw on" in the case of a single man. The moral to be drawn from the action is that, even now, there are limits within which Trade Unions or their representatives must keep if they wish to steer clear of troublesome consequences of their acts.

In the course of the report, reproduced in the "JOURNAL" last month, of the deputation of the Streets Committee of the Corporation of London who recently visited certain cities on the Continent to inspect the public lighting, Vienna was referred to (p.178) as the "capital of the Austria-Hungarian Monarchy." Mr. W. H. Shrubsole, who has devoted much study to the affairs of both Austria and Hungary, writes to point out that they are two distinct and equal States which are allied to a very limited extent. He says there are two Thrones, two Crowns, and different laws in the two countries. Moreover, Austria and Hungary make treaties with each other, which could not be done if the two formed but one State.

We learn that the Committee of the "B. H. Thwaite Fund" have now received from Mr. Carnegie a cheque for his contribution of £500. The conditions which were attached to the offer—viz., that a further £500 should be forthcoming from subscriptions from those who recognized the value of the services rendered by the late Mr. Thwaite—had not been quite complied with; but Mr. Carnegie has not allowed the actual shortage in the amount to stand in the way. Mr. Thwaite's son, aged nine, has been elected to the Yorkshire Society School; and arrangements are being made for placing the daughter in a similar educational establishment. The Committee express their gratitude to Mr. Carnegie for his generosity and kind consideration, and their thanks to all who have assisted in the achievement of the results above recorded.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 341.)

MOST markets on the Stock Exchange last week had an inanimate and featureless time. Business—beyond the settlement of the fortnightly account, which was happily not a formidable affair—was on a very light scale; and there was no factor calculated to inspire enthusiasm. It is true favourable dividend announcements threw a gleam of sunshine into the Railway Market; but this was counteracted by much apprehension regarding the coal difficulty. The unpleasantness in Spain arising out of Moroccan affairs was yet another dark spot. The opening on Monday was tame and spiritless. The gilt-edged division was dull; and Consols began a downward course, which continued as the week went on. But in some speculative lines, there was more life. Things were much the same on Tuesday; and fresh business was very quiet, with a dull tendency, though there was no very perceptible fall in prices. Rubber undertakings attracted attention. Wednesday was fairly busy considering how near at hand was the holiday break; but hardly any of the markets had any backbone in it. The weakness of Consols, the fading hopes of a coal settlement, and the upheaval in Spain were all depressing factors. Thursday opened weak, and under the influence of the same factors; but in view of the settled account and one or two rather cheering points, there was a moderate improvement before the close. With the settlement completed, and a long closure from Friday night till Tuesday morning before them, the attendance of members on Friday was scanty; and business was quiet accordingly. The Money Market exhibited no change; and the same easy rates held on with persistence unaffected by a good demand from the Stock Exchange. Discount terms were unchanged also. Business in the Gas Market was quieter and almost devoid of feature—quotations hardly moving. In Gaslight and Coke issues, the ordinary was steady, with transactions ranging from 104¼ to 105. The secured issues were busier. The maximum changed hands at from 88¼ to 89, the preference at from 105 to 106, and the debenture at 86¾. South Metropolitan had a few dealings at 122 and 122¾. In Commercials, the 4 per cent. made 109½ and 108½ special, and the 3½ per cent. 104½ and 104 special. Among the Suburban and Provincial group, Bournemouth was done at 29 and 29⅛, ditto "B" at 16 15/16, ditto preference at 15⅝, Brentford old at 257, ditto new at 196¼ and 197, British at 43⅜ and 43¼, and South Suburban at 122. The Continental Companies were inactive. Imperial changed hands at 179¾ and 180, ditto debenture at 97, Malta at 5 1/16, and Tuscan at 9 1/16. Among the undertakings of the remoter world, Melbourne 4½ per cent. was done at 101¾, Primitiva at 6⅞ and 7, ditto preference at from 5½ to 5 9/16, and River Plate at 16 1/16 and 15 13/16.

ELECTRICITY SUPPLY MEMORANDA.

What Mr. Haydn Harrison Ought to Know—Deception of Individual Accounts—House Decorators the Friends of Gas—Fresh Efforts to Capture Cooking and Heating for Electricity—To Prevent Transfer to Private Plants—Hope! Hope on!

A FORTNIGHT ago criticism was made of an article written by Mr Haydn Harrison, and published in the "Electrical Times," in which were computations as to gas consumption and prices that we had no hesitation in labelling as crass absurdities. Mr. Jacques Abady went one better, by going direct to the columns of our electrical contemporary, and pointing out wherein Mr. Harrison had been incorrect in his assertions. This gentleman has deigned to notice Mr. Abady in a letter for which we thank him, as it confirms our estimate as to his ignorance of the course of affairs in the gas industry. The letter of Mr. Harrison is not to the point. As a matter of fact, he thinks to settle the matter by posting up his own righteousness, and sneering at the correspondent who seeks to administer a little monition. "Mr. Abady," he says, "trots out so many of the figures which appear to be the stock-in-trade of the gas industry, that I think any answer to it is quite unnecessary, as your readers are themselves in a position to know whether I am in the habit of making statements which are not corroborated in practice." As a photometrist, and as one with a practical experience of gas burners and mantles, we cannot admit that Mr. Harrison has an experience with any correspondence in extent to that of Mr. Abady; and as the firm with which the latter is connected are just as interested in serving the electrical as the gas industry with the scientific instruments they produce, there is a strong inclination on our part to put his impartiality on a higher level than that of Mr. Harrison. But the final lines of the brief letter of the latter gentleman seals the degree of his present knowledge of the trend of affairs in the gas industry." I note that Mr. Abady pins his faith on the inverted gas mantle. If this form of gas-burner is as satisfactory as he seems to think, why is it that it is so little used by the ordinary consumer?" If Mr. Harrison were behind the scenes, he would know rather more of the extent that the inverted burner and mantle are being adopted by the ordinary consumer. He would know something as to why mantle factories are now so busy making the inverted form; why it is that the makers of the burners have had to extend their means of production to meet the demand; why the factors all over the country have had to extend their capacity and accommodation for dealing with the inverted burner business; and why it is that makers of gas and electric lighting fittings in the Birmingham district are busier turning out brackets and pendants for the inverted gas-burner than any other form of lighting fitting. The reason is that the inverted burner offers a greater efficiency, a lower gas account for lighting, a lower consumption of mantles, than anything yet offered for domestic use, and at a less annual cost; and, above all, to get these benefits, their houses have not to be wired—the existing gas-piping suffices.

The stupidity of the practice of taking the lighting accounts of any single house as a testimony of what can be done by any system of lighting, without quoting the hours of use, is illustrated by the "West Ham Electrical Bulletin," though the ex-Sales Manager (Mr. H. Holmes) has been very fond of doing this. Without being acquainted with the hours of use, a comparison between one period and another, or between house and house, or between lighting system and lighting system is unreliable; and particularly is it so when electricity is compared with gas, and there is lapse of memory causing omission of factors as to whether ancient flat-flame burners are still in use, or whether gas cooking and heating stoves are employed. The accounts published by the "Bulletin" are not comparisons with gas; but the plain accounts of seventeen consumers in one road who use electricity—whether entirely is not stated. Being all in one road, it may be assumed that the houses are of one class, and their rental is stated to be about £60 a year. Some of them must be very poorly lighted. Take one designated "B." It contains only two 8-candle power carbon filament lamps, ten 16-candle power ones, and two 32-candle power Osrams; and the year's account comes out to £2 3s. 9d.! It is impossible for a £60 a year house to be adequately illuminated for this sum for a whole year with electricity at 3d. per unit. The maximum possible hourly consumption of these lamps is 784 watts. A little lower down in the table is consumer "F," who has four 8-candle lamps, eight 16-candle ones, and eight 32-candle Osrams. The maximum possible hourly consumption here is 960 watts; but the lighting account is £8 5s. 3d.—only about 20 per cent. difference in maximum possible wattage, but over 70 per cent. increase in actual annual cost for current. Showing again how little reliance can be placed on individual accounts without knowing the hours of use, compare the figures of "B" (already given) with case "E," in which are connected six 8-candle carbon filament lamps, eleven 16-candle power lamps, and two 32-candle power Osrams. The year's cost in this case is £7 8s. 6d., compared with £2 3s. 9d. in case "B." Take case "D," in which five 8-candle power lamps, eleven 16-candle power ones, and nine 32-candle power Osrams are used, the cost is only £4 0s. 6d. But in case "P," the consumer uses 24 8-candle power carbon filament lamps (the equivalent of 27 is used by "D") and nine 32-candle power Osrams (the same as "D"), the year's bill comes to £8 7s.—more than double "D's" account, although the equivalent of three 8-candle power lamps less are used. One of our electrical contemporaries points out that the average bill of the seventeen houses is £5 3s. 5d. But what is the good of speaking of an average when the individual accounts are so widely discordant? It is also remarked that, if Osram lamps were used throughout these houses, the average yearly cost might easily be brought below £4—"a figure which gas would find it hard to beat." How so, when £4 with electricity—taking West Ham prices—at 3d. per unit will only pay for (using Osrams) 256,000 candle-hours, while £4 of gas at 2s. 8d. will purchase at least (using it in the new inverted lamps) 600,000 candle-hours?

We have just learned, with the utmost satisfaction, that house decorators are the friends of gas suppliers, and not of electricians, on the same ground that the chimney sweep is the friend of the coal vendor, and not of the gas supplier. We all have our friends and our enemies—in the sense of the word as bounded by competition and selfishness. The reason, we are told, why house decorators love gas rather than electricity is that "while the decorator was usually sent for annually before the installation of electric lighting into premises, the decorations after the installation last for many years." But the decorator must surely be wavering in his love for gas; for with the considerable extension of the use of bijou and medium size inverted gas-burners, and even larger sizes (where the hot currents have lateral escape from the top of the burners and do not have smart vertical ascent to the ceiling), ceilings and wall papers continue clean so long that people are pleased to have rooms redecorated for a change—if not for sanitary reasons. Even the office of the West Ham Electrical Engineer was undergoing a thorough spring clean recently—so thorough that certain papers got mislaid that Mr. Ross Hooper would have been very pleased to inspect.

Central station engineers are still wrestling with the problem, and will continue to do so until they weary of the task, of how to maintain revenue from householders by inducing them to use more units in view of the consumption reducing power of metallic filament lamps. It is a large and momentous problem; and all sorts of ineffectual ways and means have been devised for attacking it. The difficulties are that the shrinkage of revenue per house represents also a shrinkage of return on the capital expenditure per house; and, furthermore, if revenue compensation is to be obtained *viâ* cooking and heating, the electricity itself will be far less profitable than if used for lighting. To compensate in revenue for one lighting unit, three, four, or five units at a penny apiece must be consumed for cooking or heating, and those three, four, or five lighting units will cost more to produce and deliver than one lighting unit. Moreover, this class

of cheaper unit consumption is only to be obtained by introducing a duplicate system of wiring and measurement, which again reduces the value of the business as a profit-producing means. However, these difficulties notwithstanding, we are told that it is in this direction central station engineers are, in the hour of their need, lifting their eyes, and that the business is to be worked for all it is worth. Perhaps it would be uncharitable to hope it will be; seeing that, through it (taking all points affecting it into consideration), the station engineer is more likely than not to get himself and his finances into a worse tangle than now. One venturesome writer predicts that "electric cooking and heating will during the next year make more progress in popular favour than they have during a century." But the days of miracles are over. Heat units that are not in electricity cannot be obtained from it. Much more must be got out of electricity than is in it to enable it to effectually compete with solid and gaseous fuels. Nevertheless, many station engineers are trying their luck at getting connections for cooking and heating, though so far success has not been great. The price of the appliances is one of the drawbacks; and it is understood there is a movement afloat for the amalgamation of certain electric supply undertakings for the purchase of cooking and heating appliances, so that the makers who secure the joint order can produce under the most economical conditions, and so be in a position to sell their goods at a more reasonable price than now. All these efforts will be kept well in view by gas suppliers.

Some time ago reference was made to the trouble that electricity suppliers were experiencing by reason of owners of large establishments finding out that they are paying exorbitantly for electricity for lighting purposes, and that energy can be obtained much cheaper per unit by putting down a private plant with a gas-engine as the prime mover. One or two of the London Companies were complaining of this six months ago. The suppliers of electricity are in this matter on the horns of a dilemma. They charge a high price per unit to large consumers for lighting for the same electricity that they charge a low price for to smaller users of energy for power purposes. The large consumers for lighting naturally say, "If you can supply the power consumers at that extraordinarily low price, why cannot you supply us at a greater rebate than you do from the ordinary charge for lighting current?" They cannot understand the various factors that electricity suppliers take into account, or are supposed to take into account, in settling prices. Anyway, it follows that, if the power consumer can generate from a private plant with advantage to himself, the large long-hour lighting consumer should be able to do so, inasmuch as he has to pay for town-distributed current from 100 to 300 per cent. more than the power user. Electricity suppliers cannot resist this argument. Many an electricity undertaking has lost a considerable consumer because there has been attempt at resistance; and the latest to find that resistance is no longer prudent is the Marylebone Borough Council. The Electricity Supply Committee have reported that, owing to competition with private plants, it has been found necessary to arrange to give special terms to those consumers who have a maximum demand of 50 kilowatts and upwards, and who are prepared to enter into an agreement for at least ten years. The decade's agreement shows a marked prudence, if it does not have the effect of making the large users of electricity "cry-off."

A big ambition is quite the proper thing. Last week we were reviewing a book on "Electricity for Everybody," in which the writer said the time would undoubtedly soon be here when about 75 per cent. of the buildings in every city and town would be wired for some application or other of electric light, heat, and power. There is nothing like having a good opinion of oneself. In the last Industrial Supplement of "The Electrician" an article appeared headed "De Omnibus Motorum," in which the writer commences in a profoundly pessimistic tone, and winds up in a most optimistic spirit. That, too, is quite the proper thing; and it adds to the gaieties of our competition to find our opponents are not perpetually ill at ease. The first lines of "De Omnibus Motorum" run thus: "At the present time, it is certainly hard for anyone connected with the electrical industry to feel very optimistic about the future." That is rather painful; but after wading through the article, we come to these final sentences, which breathe of a blessed future: "There is certainly no lack of missionary work for us to do. And with us lays the onus of realizing within as short a time as possible that 'electric city,' and that electric country, too, in which smoke stacks will be few and far between, perhaps non-existent altogether; where the electric-drive will be universally employed in factories; electricity for lighting and heating purposes in all houses; and the present much too serious pollution of the atmosphere will be mitigated." While the electricians are talking about it, the gas industry is busy putting in cooking-stoves and gas-fires, and supplying apparatus of many kinds for industrial purposes. Does our recollection play us false? If not, there are about 600,000 gas cooking-stoves on hire in the three London Gas Companies' areas, without those privately possessed.

The Bury St. Edmund's Managership.—Out of a number of candidates for the position of Manager of the Bury St. Edmund's Gas Company, in succession to Mr. A. Mitchell, for which applications were invited in the "JOURNAL" for the 29th of June, Mr. A. F. Young, of Cockermouth, has been selected; and he will enter upon his duties next month. Mr. Mitchell will retain the Secretaryship of the Company.

ELECTRICAL DISCOURTESY.

THE "Electrical Times" has published a comment this week on the articles that have appeared in our columns, recording, on Mr. G. F. L. Foulger's retirement from the position of Chief Distributing Engineer of the Gaslight and Coke Company, some of the incidents in his professional career. The comments of our contemporary conclude as follows:

> We are able to add that in all this vigorous career of stalwart gas proselytism, perhaps the most interesting of the incidents known and disclosed is that which succeeded Mr. Foulger's farewell ceremony and presentation. He promptly had his house in Clapton fitted from top to bottom with electric light.

In reference to this statement (which, to say the least, cannot be regarded as in the best of taste), Mr. Foulger has asked us to publish a copy of a letter that he has addressed to

[COPY.]

The Editor of the "Electrical Times."

Sir,—My attention has just been drawn to a reference to myself which appears in your issue, bearing date the 29th inst. I must leave the matter of your comment to your readers to judge as to whether or no your allusions in regard to my private matters are fair or in good taste. If, however, the suppliers of electricity are in such a condition that they have to sacrifice all courtesy, and embrace every opportunity (fair or unfair) in order to bolster up the commodity they deal in, I suppose I must consider myself flattered that the temporary use of electric current is expected to stand them in such good stead as to necessitate so wide a reference to my action in using it.

The facts are as under: I have just retired from active service in the Gaslight and Coke Company, but am still retained in a consultative capacity. Having, last October, gone through a serious operation, I was naturally indisposed to continue the tenancy of a house which recalled to me all I had gone through in it. In compliance, however, with a promise to my Directors that I would not leave London until my successor in office had been in his position for some little time, I took, temporarily, a house within a few doors of my old one. This house was already wired throughout for electric light. Naturally it would not have answered my purpose to have carcassed the premises with gas-pipes for so short a tenancy as I have agreed for. Apart from this, and with my recent experience of electricity, I should certainly have installed inverted incandescent gas in preference.

Although I consider your references to my private affairs unprofessional, I hope you still possess a sufficient store of that commodity, fairness, to give equal publicity to this letter that you have given to your references which have called for it.

Upper Clapton, N.E., July 30, 1909. (Signed) G. F. L. FOULGER.

PERSONAL.

Mr. ALEXANDER WATT, of Banchory, has been appointed, out of forty-eight applicants, Manager of the Alyth Gas Company, in the room of Mr. Andrew Robertson, resigned.

The commemoration of the centenary of the birth of Ferdinand Redtenbacher, formerly a distinguished professor at the Technical College at Carlsruhe, was made the occasion for the conferment of a number of honorary degrees. Among those selected was Herr EMIL BLUM, the General Manager of the Berlin Anhalt Engineering Company, who received the honorary degree of Doctor of Engineering.

A special meeting of the Streets Committee of the Corporation, which deals with the lighting of the City of London, was held last week for the purpose of selecting a Chairman to fill the vacancy caused by the sudden death of Mr. Alfred C. Teuten, as referred to in our last issue. The result was the election of Mr. JOHN STOPHER, who is a past Chairman of the Committee, having held that office during 1907-8. The new Chairman has always taken a great interest in the public lighting—having been one of the deputation appointed to visit the Continental cities with respect to this matter, and one of the signatories to the report recently issued with regard to the future lighting of the City of London.

A number of members of the Royal Agricultural Society visited Woburn last Thursday to inspect the progress of the experiments being carried on there. Fields of wheat and barley, where continuous crops have been grown, were seen. The conclusion arrived at was that wheat and barley could be grown on the same land continuously if proper manures were used; these being a combination of mineral manures with nitrogenous salts, such as nitrate of soda or sulphate of ammonia, or else organic manures, such as farmyard manure or rape dust.

We are interested to learn that the winner of the first prize in the honours grade of the last "Gas Engineering" examination, Mr. William A. Howie, who is a native of Kendal, and 22 years of age, is indentured to Mr. T. H. Duxbury, of South Shields, having been articled to him some four years ago. It was Mr. Howie's first sitting for the gas examinations. Mentioning this matter affords an opportunity of expressing regret that the pass lists and prize lists in these examinations give no indication of the towns in which the various candidates live, but only of the place at which they attend for examination purposes. This is a point to which attention has been drawn on previous occasions.

THE GASLIGHT AND COKE COMPANY.

Half-Yearly Report.

THE following is the report on the working of this Company during the six months ending June 30, which, with the accounts (an abstract of which appears on p. 334), will be submitted to the proprietors on Friday.

The accounts for the past half year show that, after providing for fixed charges, setting aside £10,000 towards the redemption fund (in accordance with the provisions of the Company's Act of 1903), and making a special contribution of £27,077 17s. 3d. to the co-partnership fund, there remains a balance of £339,872 0s. 9d. The amount brought forward from the previous half year being £423,323 17s. 11d., there is a total sum available for distribution of £763,195 18s. 8d., out of which the Directors recommend a dividend on the ordinary stock at the rate of £4 13s. 4d. per cent. per annum, which will absorb £353,302 14s. 4d., and leave the sum of £409,893 4s. 4d. to be carried forward to the credit of the current half year.

The sales of gas for the half year show an increase of ¾ per cent. compared with the quantity sold during the corresponding period of 1908. There has been an addition during the six months of 10,236 consumers, and an increase in the number of gas-stoves sold and let on hire of 15,387.

The Directors have to report that contracts for the supply of coal and oil for the next twelve months have been made at prices lower than those paid during the previous year.

The Company's Bill in Parliament for the acquisition of the undertaking of the West Ham Gas Company has been read a third time in the House of Commons, and has been passed by a Committee of the House of Lords.

The co-partnership scheme, mention of which was made in the last report, has now been established, and over 8000 officers and workmen have been admitted as co-partners.

The Directors regret to announce the death of their esteemed colleague Mr. Howard Charles Ward, who was for 45 years a Director, and for 26 years Deputy-Governor, of the Company. Mr. Joseph Lister Godlee, Chairman of the West Ham Gas Company, has been elected to a seat on the Board. Mr. Ulick John Burke, who has long been connected with the Company, has been elected Deputy-Governor.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distributing Departments respectively with the usual certificates that all the Company's plant has been maintained in thorough efficiency.

CORBET WOODALL, Governor.

Horseferry Road, Westminster, S.W., July 19, 1909.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report.

THE following is the report of the Directors of the Company for the six months ended the 30th of June, which, with the accounts [see p. 334], will be presented to the proprietors at the ordinary half-yearly meeting on the 11th inst.

1.—After payment of the full sliding-scale dividend at the rate of £5 6s. 8d. per cent. per annum, the profit on working provides a sum of £66,726 to be carried forward. This result has been achieved notwithstanding the fact that the sales of gas have been practically stationary during the period under review. It is, however, anticipated that the reduction in price from 2s. 3d. to 2s. 2d. per 1000 cubic feet from Midsummer last will tend to stimulate an increase in consumption.

2.—Coal has been cheaper, but the saving in cost has been more than counterbalanced by the loss on coke and breeze. The disturbed condition of the coal trade, due to the introduction of the Mines (Eight Hours) Bill, is the cause of much anxiety, and has necessitated carrying heavy stocks in order to provide against possible interruption of supplies.

3.—Residual products have yielded considerably less; both coke and ammonia having fallen in value. The price received for pitch has also been low. On the other hand, the world's requirements of creosote for timber preservation have helped to maintain the average value of tar products. Improved gas-making methods have brought about a saving of 30,000 tons of coal in the half year, and consequently modified the return from residuals. The quantity of gas sold per ton of coal carbonized has been 11,027 cubic feet—the highest figure yet reached in the Company's history.

4.—Distribution costs do not show any diminution, but the improved facilities furnished thereby are increasingly popular. The policy of providing local offices and show-rooms in various parts of the Company's district has been found advantageous, and is being extended. More than 20,000 water-slide chandeliers have been altered at the Company's cost since Christmas last, and every endeavour continues to be made to eliminate the use of such unsafe appliances.

5.—A sum of £2000 has been contributed to the fund that is being raised to perpetuate the memory of the late Sir George Livesey by the endowment of a Chair of Gas Engineering named after him at the University of Leeds. There are many problems in the gas industry awaiting systematic and scientific investigation, the benefits arising from which will be felt by this Company in common with other gas undertakings.

6.—The Board consider this a favourable opportunity to write-down the reserve and insurance funds to their present market values. The practice hitherto has been to bring forward as the respective balances of these funds the total of the amounts from time to time transferred to their credits *plus* interest. Owing to the fall in trustee securities generally, the amount invested would not now be realizable by their sale; and they have, therefore, been brought in at the reduced figure.

7.—The advantages of co-partnership are emphasized as time goes on and experience under it increases. This Company may well be proud of having been twenty years ago the pioneer among gas companies of a movement which is now generally recognized as a remedy for many, if not all, of the difficulties attending a true fusion of interests between capital and labour.

8.—Mr. W. Doig Gibb has been appointed to fill the vacant post of Chief Engineer. Mr. Gibb occupies a similar position with the Newcastle and Gateshead Gas Company, and it is believed there will be found in him the requisite qualifications of age, experience, and ability. Mr. James D. C. Hunter has been elected an Employee Director in place of Mr. Charles Drumgold, who resigned on his promotion to Chief Storekeeper.

CHARLES CARPENTER, Chairman.

709, *Old Kent Road, S.E., July* 28, 1909.

THE WEIGHING OF CARGOES OF COAL AND OTHER MATERIAL.

The Porhydrometer.

THE quantity of material for the shipment of which gas undertakings—both at home and abroad—are responsible is considerable; and several undertakings are the owners of vessels and barges for the transport of their material. As buyers and sellers and shippers, the question of the weight of cargoes is an important one to the gas undertakings concerned; and anything that can be done to save labour and time in this connection, and simultaneously to ensure accuracy and ready checking, means money. For example, a large part of the coal purchased for gas making—and 15½ million tons were bought in the year of the last returns for home consumption by statutory gas undertakings alone—is seaborne; and to this has to be added the large amount of British coal shipped for use by gas-works on the Continent and further afield. Besides coal, there are the shipments of the bye-products and other materials, the weight of all of which in and out of the vessel has to be ascertained and checked.

This is sufficient to show that the gas industry has an interest in an instrument to which claim is laid that it will measure, with the utmost accuracy, the dead-weight placed on board, or removed from, any ship, barge, or other floating vessel to which it is fitted. This instrument is called the "Porhydrometer." We do not like the name; but the choice belongs to others. The inventor of the instrument is Signor de Lorenzi; and while in the greater part of the mechanism there is nothing new, in the application of the combination of mechanism and principle, there is ingenuity, simplicity, and (it seems to us) novelty. If, too, the instrument satisfies shipping experts, no cargo-carrying vessel will in the near future be complete without it. The principle upon which the instrument is based is the infallible one that a body floating in a liquid of whatever density displaces a quantity of liquid exactly equal to its weight. By its application the vessel is thus transformed into a gigantic weighbridge or weighing-machine.

In the centre of the vessel a vertical tube is fitted, extending from well below the light draught water-line to well above the load-line, and connected by a pipe with the outside shell of the vessel, so that, when the valve or cock is opened, the water in which the vessel is floating has free access to the vertical tube, and rises in it to exactly the same level as outside the vessel—the water or liquid both in the tube and outside the vessel being thus of the same density. Inside the vertical tube is fixed a vertical float, called the aërometer, which, having exactly proportionate horizontal areas at the various immersions to the areas of the planes of flotation at the same draughts or immersions of the vessel, has an exactly similar displacement, and reduces the enormous weights dealt with to a measurable quantity. The aërometer being immersed in the same liquid to the same extent as the vessel itself, by its consequent exactly proportionate displacement, loses an amount of weight exactly equal to its displacement. This loss of weight disturbs the balance of levers, and is exactly registered or counterbalanced by moving the weights along the steelyard, giving a reading of the weights placed on board the vessel, and *vice versâ* weights removed. The tube being fixed in the centre of the vessel, neither transverse inclination nor change of trim, it is said, will affect the accuracy.

Briefly stated, the advantages of the instrument to the ship-owner, charterer, and shippers are claimed to be important in both saving and protection, as will be seen from a consideration of the following points that are submitted by those interested in the invention: "(1) The cargo is accurately weighed in one operation. (2) The captain or officials in charge are at all times in a position to ascertain the weights on board. Coal taken at a

coaling port can be weighed correctly. In various foreign ports, it is well known that a full ton of coal is rarely if ever supplied. In Mediterranean ports, a shipowner rarely receives more than 15 or 17 cwt. to the ton. (3) In case of leakage through collision, grounding, or any other cause, the element of danger, and capacity of the pumps to cope with it, can be accurately gauged, and the course regulated accordingly. (4) The instrument cannot get out of order or lose its accuracy. (5) By weighing total cargoes in one operation, or parcels of goods loaded or discharged by themselves, when they are completely placed on board, or taken from the vessel, a great saving in cost is effected. (6) For the same reasons, the loading or discharging can be carried out with very much greater rapidity, resulting in the reduction, if not complete avoidance of, demurrage. (7) Its great simplicity. (8) It is invaluable for checking the amount of water in the ballast tanks. (9) The density of the water does not affect the accuracy of the instrument."

We understand that the "Porhydrometer" can be fitted to any vessel of any type, whether large or small, or for sea, river, or lake service; and that the cost of installation is small. The Italian Government has tested the invention, and has approved of it, and, further, has decreed that the customs shall accept as correct the weight of cargoes measured by the "Porhydrometer." This means that instead of a shipowner paying 23 centimes per ton for the customs' weighing dues, he has only to pay 8 centimes—saving nearly 200 per cent. in Italian ports. With regard to the point as to protection, the instrument having attached to it an electric bell, when a leak is sprung, a warning is given by the ringing of the bell. The fact of knowing the extent of a leak is unquestionably of great importance to shipowners.

By invitation of Mr. Edward Beresford, a considerable company assembled at the Temple Pier yesterday week to receive an explanation of the invention and to witness a demonstration of its utility by the Engineer, Mr. Alexander Murray. Among those present were several gentlemen interested in shipping; publicly distinguished among them being Admiral the Hon. Sir Edmund Fremantle and Lieutenant Shackleton. The company were received by Lord Louth and Mr. Beresford. The instrument was fitted on the barge "Renown," of 180 tons capacity, the property of Messrs. William Cory and Son, Limited. The construction of the parts of the instrument, and its fundamental principles were quickly appreciated by those present, through the explicit explanations of Mr. Murray. But the demonstrations of its utility were somewhat spoilt by an oversight. The boat was moored against the pier pontoon by taut cables; and though a large number of the company went on board, the instrument obviously failed to accurately register the weight of the living freight. But when the barge was liberated from its stays, and was free to move in the water, the weight of only one man was approximately indicated by the instrument, though the weight was comparatively infinitesimal compared with the weight of the barge and its carrying capacity. Criticisms of the instrument of a conjectural nature might be made; but there would be little value in them without witnessing demonstrations, under varied conditions, of a more practical nature than that afforded at Temple Pier yesterday week. If the efficiency of the apparatus is proved to be of the high order claimed, the next progressive step should be to fit to it some self-recording arrangement. It is to be hoped that the ingenuity and simplicity of the instrument will receive the reward of a thoroughly proved utility, and then a speedy adoption is bound to follow.

The Editor of the "American Gaslight Journal" recently had a visit from Mr. Thomas Newbigging—"the Hon. Thomas Newbigging, of Manchester, the greatest of all living gas men," as they style him. The Editor says "the well-loved veteran was as nimble of stride, hearty of grip, resonant of voice, and beaming of demeanour, as though not more than fifty years had been his portion in the allotment of days that are done. His visit to America, too, was strictly in line with work; he having accepted a retainer to counsel with Mr. Pearson, of Toronto, over the best type of holder to be constructed on the great new plant of the Consumers' Gas Company of that city."

The reinforcement of concrete by wire nails, in order to raise its compressive strength far beyond the limits of ordinary mixtures, created considerable interest at the recent convention of the American Society for Testing Materials. According to "Engineering Record," the method was employed by the Department of Bridges of the City of New York for filling spaces in some important bridge pedestals, and the tests made before the adoption of the material were described by Mr. Leon S. Moisseiff. He stated very clearly his position regarding the use of this material; pointing out that its cost is prohibitive in ordinary cases, but may be warranted under exceptional circumstances, as in the case of the filling for the bridge pedestals above mentioned. He pointed out, too, that in cases where column footings are to be raised or a foundation has settled, concrete reinforced in this manner might be advantageous. The highest stress developed in the tests was 17,800 lbs. per square inch; the specimen being a 6-inch cube, 15 months old. This value is apparently not accidental, for the companion cube of the same age and size gave a strength of 16,650 lbs. per square inch, while some 12-inch cubes did not fail at the maximum limit of the testing-machine, at which limit they were under a load of 15,300 lbs. per square inch.

FIFTY YEARS OF AMERICAN GAS JOURNALISM.

For some months past, intimations have been given by the conductors of our contemporary the "American Gaslight Journal" of their intention to mark the occurrence of its jubilee on July 1 by the issue of a special number, which it was claimed would "exceed in value any other special number of a technical paper heretofore published, in its special applicability to the industry directly concerned." The number, the literary portion of which occupies 138 quarto pages, is now to hand; and the following is an outline of its contents:

The first page is appropriately occupied with the commencement of an interesting account, written by Mr. T. J. Cunningham, of the foundation of the paper by Messrs. John B. Murray and Co., Bankers, of Wall Street, New York. It was originally intended to be a price current of the gas shares of a few of the principal cities, prepared for gratuitous distribution monthly to the correspondents and dealers of the proprietors. While the sheet was in preparation, however, they were solicited to enlarge the sphere of their plans by embracing all the American Gas Companies, and giving such details as would enable parties interested to compare notes, and avail themselves of every means of improvement, economy, and profit. The request was acceded to, and a sheet of four pages was the result. It was the first paper ever published in America identified with the important interest of gas lighting. Though the responsible Editor was Mr. J. B. Murray, much of the literary work fell upon Dr. John Tarrey and Professor Henry Wurtz. On July 2, 1860, the paper appeared for the first time as a semi-monthly publication (the 1st and 15th of the month); the size being 16 pages. At the end of the year, the editorship passed into the hands of Mr. C. Elton Buck, a young man of considerable scientific attainments, under whose direction its tone was much improved. On Jan. 1, 1863, Messrs. Murray and Co.'s name no longer appeared as proprietors; both the business and editorial direction of the paper having been concentrated in Mr. Buck. On July 1, 1864, the name was changed to the "American Gaslight Journal and Mining Reporter," the Editor and Proprietor being Mr. James W. Bryant and the Consulting Chemist Mr. Buck. Towards the end of the same year, Mr. Mills L. Callender became connected with the paper; and on July 2, 1866, it was published by Messrs. Bryant, Callender, and Co. The death of Mr. Bryant early in 1868 resulted in it being taken over by Mr. Callender, and its title changed to the "American Gaslight Journal." Professor Wurtz edited a department under the head of "Chemical Repertory." In January, 1870, the late Mr. Charles E. Sanderson entered the service of Messrs. Callender and Co. Professor Wurtz severed his connection with the paper in September, 1875, and Major George Warren Dresser took the editorship. By the following year the size had increased to 24 pages. An important event occurred with the issue of the 35th volume (July 2, 1881), when the name of Mr. Charles E. Sanderson appeared officially as Manager—a position he had filled since a few months after Mr. Callender's death. In the summer of 1882, Major Dresser died, and was succeeded by Colonel J. R. Thomas, the Chief Engineer of the Williamsburgh Gas Company of Brooklyn (N.Y.). In 1884, the services of Mr. Norton H. Humphrys were secured as Special English Correspondent; his first letter appearing in the issue for the 2nd of April. The size of the paper was now, on an average, 32 pages; and on Jan. 7, 1889, it appeared for the first time as a weekly publication—Mr. T. J. Cunningham being appointed Editorial Assistant to Colonel Thomas. In November, 1895, the death of Colonel Thomas was announced; and the editorship then devolved upon Mr. Cunningham and Mr. Elbert P. Callender (a son of the late Mr. Mills L. Callender), who still share the duties. In 1897, the size of the paper was increased, and it now averages 48 pages. On Feb. 20, 1907, Mr. Sanderson died; and at the beginning of the present year Mr. Charles H. Wadelton was appointed Manager. This chapter, especially the latter portion of it, covers a critical period in the history of the gas industry, as it deals with its condition during the war, with the controversy over water gas, the introduction of the electric light and the coming to the front of Mr. T. A. Edison, the discovery of the Welsbach burner, and the more extended use of gas for other than lighting purposes.

These historical particulars are followed by a sketch, by Mr. Arthur E. Boardman, of the work of four of the pioneers in bringing about what may be called the fraternity of gas engineers and managers—viz., Major Dresser, Colonel Thomas, Captain W. H. White, and Mr. G. A. M'Ilhenny. This sketch is appropriately followed by a chapter by Mr. George G. Ramsdell, on the influence of the work of Gas Associations on the gas industry. The formation of the New England Association in 1871 initiated the movement. Two years later, the American Gaslight Association came into existence; and others sprang up in course of time—the latest comer being the Pennsylvania State Gas Association, organized in the spring of the present year. No better man could have been selected for dealing with the progress of gas manufacture in New York City during the past fifty years, which is the subject of the next chapter, than Dr. A. H. Elliott, the Chemist-in-Chief of the Consolidated Gas Company. The interest of the author's text is heightened by the curious views of the Manhattan Gas-Works by which it is illustrated. Equally interesting is the account given by Mr. H. Thurston Owens of the progress of street

lighting in New York, which must have involved considerable research, especially the chronology which forms an appendix to the chapter. Going away from New York, Mr. John A. Britton, the Secretary and Treasurer of the Pacific Coast Gas Association, supplies some historical notes on the development of the gas business in that part of the American Continent; Mr. W. M'Kay does the same for Boston (Mass.); Mr. W. H. Pearson for Canada; and Mr. Norton H. Humphrys for Great Britain.

Some interesting and instructive chapters deal with manufacturing operations. Mr. Frederic Egner (whose portrait is given) describes the various processes he has known; Mr. James D. Perkins offers some observations on the gas coals of America; Mr. F. N. Morton gives a half-century's history of water gas; Mr. F. Bredel deals with the application of gaseous fuel to the heating of gas-retorts during the same period; and Mr. F. J. Mayer describes systems of vertical retorts. Mr. Morton's chapter is a valuable one, not only for the matter contained in it, but also for its exceedingly interesting collection of illustrations (57 in all), showing types of plant from Ibbetson's in 1824 to those of Dellwik-Fleischer, Strache, and Kramer and Aarts. Mr. Bredel has also brought together and fully illustrated a great deal of information in regard to a subject on which he is an acknowledged authority; and his chronological table forms a useful appendix to his communication. Mr. Mayer's chapter consists of observations on the Dessau, Bueb, Settle-Padfield, and Woodall-Duckham systems of vertical retorts; the Bueb system being dealt with at the greatest length. Mr. Carroll Miller discourses in a general way on residuals obtained in the manufacture of gas by various processes; and Mr. R. W. Hilgenstock deals with the development of the ammonia industry in gas-works during the past half century.

The rest of the chapters are on subjects bearing upon distribution and the commercial side of the gas industry. Mr. D. M'Donald has something to say on meters and meter makers; Mr. George W. Whyte shows how the manufacture of pipes has developed; Mr. E. P. Reichhelm has a short chapter on heating-machines; and Mr. W. H. Gartley deals with present-day photometrical practice. Dr. C. J. Russell Humphreys supplies a chapter on the development of the Public Utilities Commissions as applied to the gas and electric business; an address on the subject of these Commissions delivered by Mr. Rufus C. Dawes at the banquet of the Illinois Gas Association early in the year is reproduced; progress in the development of electric current in the field of artificial lighting is reviewed by Mr. A. F. Ganz; the value of demonstration work in the household is emphasized by Mrs. Helen Armstrong; and the extent to which the new business division of the gas industry has developed in the period under consideration is shown by Mr. Philmer Eves. A collection of historical productions such as those here briefly noticed would hardly be complete without some personal reminiscences; and these are furnished by Mr. J. B. Howard, the President of the Galena (Ill.) Gas Company, who was associated with gas affairs as long ago as 1844.

In closing this notice of our contemporary's jubilee number, it must be acknowledged that it justifies to a large extent the claim made for it. It is an interesting review of the progress of the gas industry in the period covered, and presents in compact form a good deal of information on the outstanding features of that progress. Those who are responsible for its production may fairly be congratulated upon the success of their effort.

Tests of Filter Sands.

The degree of purification attained by different grades of sand in slow sand filters has been investigated by Mr. A. Robin, the bacteriologist of the Wilmington (Dela.) Water Department, who gives some notes regarding the results in his annual report for 1907-8. The tests lasted about 3½ months, and were made on two experimental filters containing sands which had previously been used in other filtration plants. One bed consisted of sand having an effective size of 0·30 mm., 60 per cent. finer than 0·47 mm., and a uniformity coefficient of 1·51. The sand in the other bed had an effective size of 0·25 mm., 60 per cent. finer than 0·76 mm., and a uniformity coefficient of 3·04. In order that the two units might operate under identical conditions, they were supplied with water from a common source, and fed at a rate of 4 million gallons per acre daily with raw water developing 754 bacteria per cubic centimetre on plain agar, 72 bacteria on bile salt agar, and having a turbidity of 11·7. A higher degree of purification was obtained with the filter containing the sand of the smaller effective size; the percentage of bacterial removal being in one case 98·5 and in the other 97·7. The turbidity of the effluent from the sand with an effective size of 0·25 mm. was 0·4, compared with 1·3 for the sand of 0·30 mm. effective size; thus giving efficiencies for the removal of turbidity from the water of 96·7 and 88·9 per cent. respectively.

The Royal Sanitary Institute have appointed Professor Henry Adams, M.Inst.C.E., Dr. Louis C. Parkes, Professor W. Napier Shaw, D.Sc., and Mr. A. Saxon Snell, F.R.I.B.A., as the adjudicators for the next Henry Saxon Snell prize competition; the subject set being "The Principles of Heating and Ventilating Public Buildings." The essays have to be delivered at the Institute, 90, Buckingham Palace Road, by the 31st of August.

QUALITY OF LONDON GAS.

THE results of testings made in the official testing-places controlled by the London County Council of the gas supplied by the three Metropolitan Companies, may be summarized for the second quarter of the year in continuation of the summaries of earlier results which have been given from time to time in the "JOURNAL." The figures refer to the thirteen weeks ending June 26, 1909, and for 1907 and 1908 to the thirteen weeks ending on the corresponding Saturday of the year—viz., June 29, 1907, and June 27, 1908.

In regard to the illuminating power, the average results for the second quarter of the three years for the three Companies are set side by side for convenience of comparison in Table I. These figures refer to the statutory or "penalty" testings made with the "Metropolitan" argand burner No. 2. The corresponding figures for the testings made, for information only, with the flat-flame burner are given in Table II. The prescribed flat-flame burner in the years 1908 and 1909 is Bray's "$\frac{G}{L}$ 5 feet $\frac{15}{10}$" burner, and in 1907 it was Bray's "No. 7 Economizer," fitted over a Bray's "No. 4 regulator." The maximum figures are of comparatively little importance; but it may be noted that on one occasion in 1909 the Gaslight and Coke Company's supply showed as high a value as 18·79 candles with the argand, while the highest figure for the South Metropolitan Company's gas during the same quarter was 18·21 candles, and for the Commercial Gas Company's gas 17·82 candles. The maximum flat-flame values for the same quarter were 13·88 for the Gaslight and Coke Company, 12·90 for the South Metropolitan Company, and 11·38 for the Commercial Company. Having regard to the fact that a forfeiture is incurred if the illuminating power of the gas as shown by the argand burner falls below a certain limit, the minimum figures for the quarter for the three years may be of interest. They are given in Table III. On the other hand, the lowest flat-flame results for this quarter in 1909 were 7·60 for the Gaslight Company, 8·90 for the South Metropolitan Company, and 9·72 for the Commercial Company.

The prominent feature of the results shown in the tables is that the gas supplied by the South Metropolitan Company, which, according to their statutory obligations, need only have an illuminating power of 14 candles, shows in fact an illuminating power by the statutory argand test which is practically identical with that of the gas supplied by the Gaslight and Coke Company, which is still required to be of 16-candle power. It is apparent that the South Metropolitan Company have hitherto failed to take advantage of this liberty to supply a lower candle power gas. Probably this is due to the fact that they have not yet succeeded in finding means of producing by an economically efficient process coal gas of lower average candle power than about 16½ candles. Further, it may be noted that the Commercial Company are only now, by aid of their water-gas plant, beginning to supply gas which is on the average above the statutory requirement of 14 candles by only an ordinary working margin. Since 1907, they have seen their way to reduce the candle power of the supply by nearly a candle. When the Gaslight and Coke Company have obtained the Royal Assent to their new Act, they likewise will be able to reduce the candle power of their gas to approximately the same figure as that to which the Commercial Company are now working, and, having regard to their manufacturing plant, will doubtless do so by the same means—viz., by the incorporation of comparatively feebly-illuminating water gas with the coal gas.

Whether the South Metropolitan Company will ultimately be forced, in order to gain the full advantage of their 14-candle power standard, to adopt the same means of diluting coal gas as the other two Companies, remains to be seen; but unless it can be shown that it is as economical to manufacture coal gas of 16½-candle illuminating power as a mixed gas of 14¾ candles, it is clear that the South Metropolitan Company are not taking full advantage of their statutory powers. The only alternative to the employment of water-gas plant on their works appears to be the discovery and adoption of a process of producing coal gas averaging only 14¾-candle power in place of the present gas of 16½-candle power. Obviously such a process would not be technically economical unless the make of gas obtained per ton of coal carbonized were increased in correspondence with the reduction in illuminating power.

The results of the flat-flame testings are of little importance; but they disclose some curious relations between the gas supplies of the three Companies, and of each of those supplies in different years. Whether these relations have any material basis, or whether they are merely due to erratic observations, is a point on which different opinions will be held. It is a matter of common remark that it is more difficult for two different observers, or for the same observer at different times, to obtain concordant results in making testings with the flat-flame burner than with the argand. But it might be anticipated that any such discrepancies as would thus appear in individual testings would be wiped out in the average results of a whole quarter. Whatever may be the reason, it is worth pointing out that the coal gas of the South Metropolitan Gas Company, which on the average is only 0·2 candle lower in illuminating power, according to the argand test, than the mixed gas of the Gaslight and Coke

TABLE I.—*Testings of Illuminating Power (Argand Burner).*

Average Results for Second Quarter.

—	1907.	1908.	1909.
Gaslight and Coke Company . candles	16·6	16·92	16·75
South Metropolitan Company . ,,	16·5	16·54	16·64
Commercial Company . . . ,,	15·72	15·19	14·90

TABLE II.—*Testings of Illuminating Power (Flat-Flame Burner).*

Average Results for Second Quarter.

—	1907.	1908.	1909.
Gaslight and Coke Company . candles	11·6	12·30	11·69
South Metropolitan Company . ,,	11·0	11·34	11·03
Commercial Company . . . ,,	9·68	9·24	9·24

TABLE III.—*Testings of Illuminating Power (Argand Burner).*

Minimum Results for Second Quarter.

—	1907.	1908.	1909.
Gaslight and Coke Company . candles	15·08	15·91	15·37
South Metropolitan Company . ,,	14·5	14·51	14·81
Commercial Company. . . . ,,	14·1	14 03	13·55

TABLE IV.—*Testings of Calorific Power.*

Average Results (Calories per Cubic Foot) for Second Quarter.

—	1907.	1908.	1909.	
	Net.	Net.	Net.	Gross.
Gaslight and Coke Company . . .	131·4	131·4	130·0	145·3
South Metropolitan Company . . .	133·4	132·6	132·8	149·7
Commercial Company	128·5	127·3	126·0	140·9

TABLE V.—*Testings of Calorific Power.*

Minimum Results (Calories per Cubic Foot) for Second Quarter.

—	1907.	1908.	1909.	
	Net.	Net.	Net.	Gross.
Gaslight and Coke Company . . .	120·0	121·0	117·5	132 2
South Metropolitan Company . . .	120·9	121·6	124·8	139·6
Commercial Company	116·4	114·6	115 2	130·0

TABLE VI.—*Testings of Sulphur (Grains per 100 Cubic Feet of Gas).*

Second Quarter.

Company.	1907.		
	Aver.	Max.	Min.
Gaslight and Coke	42·6	80·0	11·7
South Metropolitan	48·2	97·2	25·8
Commercial	33·85	61·1	18·5
Company.	**1908.**		
	Aver.	Max.	Min.
Gaslight and Coke	43·2	71·2	14·7
South Metropolitan	49·3	85·0	19·0
Commercial	28·76	57·2	17·4
Company.	**1909.**		
	Aver.	Max.	Min.
Gaslight and Coke	35·7	58·8	10·5
South Metropolitan	46·2	107·3	24·2
Commercial	35·8	72·2	1·4

Company, is about 0·5 candle lower according to the flat-flame tests. The lower candle power gas of the Commercial Company naturally shows the greatest difference between the flat-flame and the argand results; but the difference, curiously enough, appears to be diminished as the illuminating power is progressively lowered in course of time. There is, on the average, a difference of approximately 1½ candles between the illuminating power according to the argand test of the gas supplied by the Gaslight and Coke Company and that supplied by the Commercial Company. The difference increases to approximately 2¼ candles when the average results of the flat-flame testings are compared. Whether there is any real significance in these figures, is more than doubtful; and in any case neither the argand nor the flat-flame testings have now any real practical value, though the Companies are still tied by the obsolete provisions of their Acts to compliance with certain standards based on the results obtained with the standard argand burner.

The testings of calorific power—which so far have only been carried out for the purpose of information, but from Jan. 1 next will, in the case of the Gaslight and Coke Company, acquire greater significance, on account of the penalty provision of the Company's new Act—may be summarized in the same way as the results of the illuminating power testings. The average results for the second quarter of the last three years are shown in Table IV. The figures for the gross calorific power, which is the true measure of the heating capacity of the gas, were not reported for the years 1907 and 1908 in the weekly returns issued by the London County Council, and so cannot be included in the table. The minimum results for the same quarter of the three years are given in Table V. It will be seen that the Commercial Company's supply, which is required to have an illuminating power of 14 candles, has not on any occasion in these three quarters fallen below the value of 112½ calories net per cubic foot, which is the limit in value above which the Gaslight and Coke Company will have to maintain their supply of 14-candle gas after the close of this year. But the figures show that the margin is none too great, and that this limit in value will be quite high enough to prove irksome to the officers in charge of the manufacturing stations of the Company.

In regard to the average figures, the coal gas supplied by the South Metropolitan Company, with a nominal 14-candle standard illuminating power, is 2 calories per cubic foot higher in net calorific power than the mixed gas supplied by the Gaslight and Coke Company under their 16-candle standard of illuminating power. The mixed gas supplied by the Commercial Company, which has the same standard illuminating power as the supply of the South Metropolitan Company, is, on the average, about 5½ calories lower than the coal gas of the latter Company and 3½ calories lower than the mixed gas of the Gaslight and Coke Company. It may therefore be anticipated that, when the latter Company's supply is reduced after the close of this year from 16 to 14 nominal candle power, the falling off in calorific power will be only about 3½ calories—that is to say, the calorific power, for a reduction of 2 candles in the nominal illuminating power of the gas, will be reduced by only 2¾ per cent. Bearing in mind also that calorific power is not the sole criterion of the value of a gas for lighting by means of incandescent mantles, but that the flame temperature or the nature of the constituents of the gas is at least as important as calorific power *per se*, it may be concluded that, for all practical purposes, the consumer will receive a supply as suitable to his requirements under the 14-candle standard as under the 16-candle standard of illuminating power. Whether the standard of illuminating power, if retained at all, may not with advantage be brought still lower (say, to 10 or 12 candles) is a point well worthy of consideration. In regard to it, the results of the flat-flame testings of illuminating power supply some information. The lowest flat-flame result in the second quarter of the three years is 7·6 candles.

Reference to the investigations reported in the last two numbers of the "JOURNAL"—viz., those by Dr. Ott, of the Zürich Gas-Works, on the results of carbonization in different types of retort (*ante*, p. 186), and those on the carbonization of German coals at the German Association's Experimental Works at Carlsruhe (*ante*, p. 238)—will show that the illuminating power of coal gas tested in a flat-flame burner may be dropped to even 3 candles without such a fall in calorific power taking place as would bring the gas below the penalty limit to which the Gaslight and Coke Company have just assented. What the drop from 7·6 to 3 candles or thereabouts in the results of flat-flame testings represents in the illuminating power of the gas as tested in the standard argand burner cannot be stated definitely; but it may be that with coal gas, if not also with mixed gas, an illuminating power in the standard argand burner of 12 candles would correspond with an average calorific power of at least 112½ calories, or 450 B.Th.U. net per cubic foot. A supply of gas of this quality should fulfil all reasonable requirements; but in order to meet the exigencies of manufacturing operations, it would be necessary that any catch-penalty limit which might be fixed upon should be below the 106 calories per cubic foot, which the Gaslight and Coke Company have reluctantly accepted in their new Act.

The results of the testings of the amount of sulphur in the gas supplied by the three Companies during the second quarter of the year are shown in Table VI. for the last three years. In regard to these figures, the most remarkable feature is the substantial drop in 1909 in the amount of sulpbur in the gas supplied by the Gaslight and Coke Company. It now averages only 35·7 grains, which is practically the same as the average during the same quarter of this year for the supply of the Commercial Gas Company. The maximum result is also commendably low—viz., 58·8 grains per 100 cubic feet. There is comparatively little change in the amount of sulphur in the gas supplied by the South Metropolitan Company, and it may be concluded that there is no reasonably practicable process of reducing the amount of sulphur in coal gas, other than by the use of sulphided lime, below the average of about 48 grains per 100 cubic feet. This figure, of course, applies only to coal gas made from coals such as those the Company ordinarily carbonize. It may be that the changes in methods of carbonization which are now being extensively made, especially in Continental gas works, will result in a reduction in the amount of sulphur in coal gas. Apart from this, it would seem that the only practicable means of reducing the amount of sulphur in a gas supply is by mixing a substantial proportion of water gas with the coal gas, as is done by the Gaslight and Coke and Commercial Companies. Whether this advantage outweighs certain well-known disadvantages of such admixture is a matter for serious consideration by administrators of our various gas undertakings.

Mr. Alfred Richards, of Gordon Square, W.C., and of Finsbury Circus, E.C., auctioneer, who died on the 17th of June, aged 51, left estate of the gross value of £64,389, of which the net personalty has been sworn at £50,171.

THE NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting at Stirling.

[From Our Own Correspondent.]

The North British Association of Gas Managers held their Forty-Eighth Annual Meeting at Stirling on Thursday last, under the Presidency of Mr. J. D. Smith, of Stirling. Other two years, and the Association will celebrate its jubilee. When this time arrives, there will be no one left in the membership who joined the ranks at the formation of the Association. The last of the original members retired at this time, in the resignation of Mr. A. Bell, sen., late of Dalkeith, whose short but pathetic letter was read to the meeting. It was a graceful act on the part of the meeting, on the suggestion of the President, to place Mr. Bell among the honorary members—an honour he well deserves, on account of his personal merits, as well as his long connection with the gas industry and the Association. Perhaps in no other Association of Gas Managers in the United Kingdom have the links with the past been more completely severed than has been the case with the North British. The dominant members of the Association of only a few years ago are all gone, and younger men have taken their place. The Association, it is a satisfaction to note, has not suffered by the change. The old leaders have disappeared; but new ones have taken their place, and the work of the Association is being carried on as vigorously as ever—probably with somewhat more vigour than formerly, due to the exuberance of minds fresh to office. The gathering at Stirling was a very large one. There were apprehensions that the business would be protracted; but so well had the arrangements been made, and so admirable were the tact and judgment of the President, that all the business was overtaken, and everything disposed of in perfect harmony, at an earlier hour than usual.

A year ago—presumably under the feeling that now the Association has been affiliated with the Institution of Gas Engineers, and that there was consequently necessity, or at least advisability, in the Association conforming more to Institution practices—it was remitted to the Committee to consider the rules and regulations of the Association. The outcome of the remit was the submission by the Committee of an entirely new set of rules and regulations of a much more extensive and detailed nature than those in existence. The Committee, when put to it to apply their mind to the subject, considered the desirability of taking powers to make the Association more an organized body in the interests of the gas industry than it has been; and their proposal was acceded to. This is a step of some importance, as it will enable the Committee, or as it is now designated the Council, to act in the name of the Association in questions which have, or may be regarded as having, a general bearing upon gas matters. Following the adoption of this new attitude, it would seem to be incumbent on the Association, if the Council are to act with authority in any question which may arise, that there should be a movement at once for an extensive ingathering into the Association of gas managers who have not yet seen it to be their interest to join. That there is room for such a movement is evident. There are over 250 gas undertakings in Scotland; and there are only, according to the President, 171 managers enrolled in the Association. Probably the Secretary of the Association—Mr. L. Hislop, of Uddingston—who takes such a deep interest in the welfare of the Association, will give this subject his consideration. It was probably with the view of conforming to the ways of the Gas Institution that the Committee put forward proposals which were intended to place a restriction upon the admission to, not to say the exclusion from, the Association of the commercial element. The extent to which the meeting went in this matter was to adopt a rule under which only principals and managers of commercial undertakings doing business with the gas industry will be admitted to the position of extraordinary members. The commercial traveller, if he has no other qualification, is to be debarred from membership. Probably as effective a bar as direct exclusion is to be found in a new provision as to subscriptions, which imposes an entrance fee of £5 upon extraordinary members. Applications for extraordinary membership will probably be fewer than they have been; and thus, through the operation of both enactments, the commercial element will probably be restricted to a somewhat select class.

The President delivered a most thoughtful Inaugural Address, for which he was deservedly thanked. The technical matter before the meeting was not of a distinguished nature—containing nothing new except in matters of detail; but it was of interest to the members, as showing them what their neighbours and colleagues are doing. In the report of the Committee, it was recommended that, on account of the cost which would be involved in the publication of the papers of the late Mr. William Young, the proposal should be relinquished. This was agreed to; but a new proposal was appropriately made by Mr. J. W. Napier, of Alloa, for the commemoration of Mr. Young's name by means of a prize to be offered to students in "Gas Manufacture." The proposal—which, it is to be hoped, will be found more feasible than the publication of Mr. Young's papers—was remitted to the Committee to deal with. It will consequently receive kindly consideration; and it is quite likely that, following it up, some means will be found for the commemoration of so distinguished a gas specialist.

The Forty-Eighth Annual Meeting of the Association was held in the Albert Hall, Stirling, last Thursday. There was an exceedingly good attendance.

The President (Mr. J. D. Smith, of Stirling), on taking the chair, expressed pleasure at seeing such a large turn-out of members. The meeting, he said, had been called for an early hour, so that they might devote as much time as possible to the important business before them. They had letters of apology from Mr. J. W. Helps, the President of the Institution of Gas Engineers, Mr. Thomas Glover, the Past-President, Mr. W. R. Herring, and a number of their members, who found it inconvenient to be present.

Report of the Committee.

The President said the first business before the meeting was the report of the Committee. If it was agreeable to them, they would take it as read; and he had much pleasure in moving its adoption. There were two items in the report the discussion of which would be left over until after the President's Address—viz., the proposed new rules and secretarial work.

Mr. W. Wilson (Falkirk) seconded; and the motion was adopted.

The report was as follows:

The forty-seventh annual general meeting of the Association, under the presidency of Mr. W. Blair, of Helensburgh, was held in Edinburgh on July 23. Mr. Blair has been appointed delegate to represent the Association on the Council of the Institution of Gas Engineers for the year 1909-10.

During the past year the Benevolent Fund has not been drawn upon. The Research Fund has been drawn upon to the extent of £31 10s. (contribution to the Livesey Memorial Fund).

It has been the constant endeavour of the Committee to carry on the business of the Association on economical yet efficient lines; and it is pleasing to record that the finances of the Association have never been in a more flourishing condition.

A testimonial, generously subscribed to by the members of the Association and friends, was presented to Mrs. Carlow, widow of the late Secretary and Treasurer, Mr. R. S. Carlow, by Mr. J. D. Smith, President, in the name of the Association. The testimonial was graciously received and fittingly acknowledged by Mrs. Carlow.

During the past year, an Eastern Commercial Section was formed under the auspices of the Waverley Association. The North-Eastern and Western Sections still continue in operation. It is to be hoped the interest in the Commercial Sections will not wane. The thanks of the Association are due to the Secretaries of the various sections.

During the past year, your Committee have devoted a considerable amount of time to the consideration of the publication in book form of the papers and contributions to the various Technical Societies and Technical Press by the late Mr. William Young. The President and the Secretary of the Association had several interviews with Mr. J. Gordon Mason, S.S.C., of Edinburgh (Agent for Mr. William Young's Executors), and also with Dr. Daniell, of London, and Mr. Walter King, of the "Journal of Gas Lighting," and a considerable amount of correspondence passed between the Committee and Mr. Mason. A bibliographical index of Mr. Young's contributions to technology was prepared by Dr. Daniell, and an approximate estimate of the cost of publication was obtained, which, it was found, would amount to over £600. As there was no prospect of the publication ever being a financial success, the Committee unanimously agreed to relinquish the idea of publication. The best thanks of the Association are due to Dr. Daniell and Mr. Walter King for the amount of valuable time and consideration which they gave to this matter.

The Statistical Report has been revised and retained as a feature of the published proceedings, in accordance with the wishes of the Association.

In accordance with the remit from the last annual general meeting of the Association, the rules of the Association have been revised and augmented, and a new set prepared for the consideration of the members. The Committee have given much time to the compilation and

preparation of these rules, and unanimously propose, and have confidence in recommending, their adoption.

Your Committee consider that the time has now arrived for the appointment of a permanent Secretary and Treasurer to carry on the secretarial work of the Association; and an opportunity will be given at the ensuing annual meeting for the members to express their opinion as to whether or not the Secretary should be a member of the Association.

The Committee desire to refer to the great loss sustained by the gas engineering profession in the death of the late Sir George Livesey. Mr. J. D. Smith and Mr. L. Hislop were delegated to represent the Association at the funeral.

Your Committee recommend that the following gentlemen be admitted as members:—

Associate Members.—Thomas Orr, Motherwell; Lawrence Kerr, Leven, Fife.

Ordinary Members.—James Bell, Kirkintilloch; James Brown, Larkhall; Watson M. Cowie, Lockerbie; Samuel Dickie, Dumfries; Thomas Lindsay, Gourock; James Purves, Ayr; Henry S. Ritchie, Fraserburgh; John M. Smith, Dumfries.

Extraordinary Members.—Peter Blair, Birmingham; James Brown, Glasgow; R. M. Cairns, Glasgow; Ralph Emmerson, Glasgow; James Fraser, Glasgow; Walter B. Hudson, Manchester; Thomas Jordan, Manchester; Chas. W. Kraushaar, Manchester; Frederick H. Lamb, Manchester; J. B. Macdermott, Glasgow; Hugh J. Miller, Glasgow; George Mills, Edinburgh; Andrew Taylor, Glasgow; Horace M. Thornton, London; Bertram B. Waller, Stroud; James D. Whitelaw, Glasgow; H. James Yates, Birmingham.

The PRESIDENT, in moving that the proposed new members and associates be admitted, said they regretted to see some of their ordinary members resigning; but it was gratifying to find so many additions to their ranks. Their total membership last year was 248; this year it would be 268.

COMMEMORATION OF THE LATE MR. WILLIAM YOUNG.

Mr. J. W. NAPIER (Alloa) said that, arising out of the report, there was a matter which, because of its importance, ought not to be lost sight of. He referred to the question of the commemoration of the late Mr. William Young. The Committee, he understood, had carried out their best endeavours towards formulating a practical scheme for publishing the contributions of Mr. Young. Unfortunately, this scheme must be marked out as somewhat impossible, because of its financial aspect. He would like to congratulate the Committee on the large amount of work which they had done in attempting to carry out the scheme, which, he might say, in certain aspects, would have been a very desirable one, and one which, he was sure, would have met the wishes of Mr. Young's warmest admirers. But he was not certain that the publication of Mr. Young's papers would have been the best way to commemorate such a distinguished individual. It had been said that the technical books in their Universities were old after ten years; and he was just afraid that, while Mr. Young was the pioneer in his conception, and in his theory of things, the book could only be looked upon as a memorial volume, and hardly as a standard work of reference. He had gone into the matter carefully, and in his own mind had formulated a conception as to what the North British Association should endeavour to do by way of keeping green the memory of Mr. Young. They must always remember that there was only one William Young, and his work was not provincial. It was work of a kind which appealed to Great Britain, and also to a wider audience. But he thought it was a duty, nevertheless, of the North British Association to take the initiative in determining what would be a satisfactory memorial. It was not his intention to discuss the form the memorial ought to take, but rather to suggest that a Special Committee be appointed in order to deal with the matter. His feeling was that a capital sum should be raised by subscription, the interest of which would be devoted to the creation, or formation, of what would ultimately be known as the William Young Memorial Prize. This prize would be given to the best student in gas manufacture throughout Great Britain presenting himself at the annual Technological Examinations. This aspect of such a memorial had several desirable features. It would be an encouragement to their young men. He thought any young man who could gain, by his own efforts, such a reward as the William Young prize, would be able to forward his own interests, and at the same time he would earn for himself considerable merit. There would also be the other satisfactory feature that, compared with the giving of a medal by their Association, or any other Association, the award would be in perfectly independent hands. He moved that a Special Committee be elected, comprising the President, the Vice-President, Mr. S. Milne, Mr. A. Yuill, and Mr. W. B. M'Lusky, to consider the matter.

Mr. A. WADDELL (Dunfermline) seconded.

The PRESIDENT suggested that it might be as well to remit the matter to the Committee of the Association, with power to add to their number. He moved to this effect.

Mr. S. MILNE (Aberdeen) seconded; and this motion was carried by a large majority.

THE AUDITOR'S REPORT.

Mr. R. B. MAIN (Glasgow) submitted the Auditor's report for the past year; and, in doing so, he said he had again to congratulate the Association on the satisfactory financial position in which they stood. The increases on the various funds were: General Fund, £19; and Benevolent Fund, £43. From the Research Fund, as they had already heard, a sum of £31 10s. had been contributed to the Livesey Memorial Fund. There was an increase in the Research Fund; and but for this contribution, the increase would have been £72. Of course, it was a very exceptional payment, which probably would not occur again for a long time; but even after paying this £31 10s., there was an increase of £41. The funds stood at: General Fund, £41; Benevolent Fund, £452; Research Fund, £145; and Excursion Fund, £36. The total funds amounted to £675. He had great pleasure in bearing testimony to the clear way in which the Secretary had put the accounts before him. Not a single correction had been made; and he thought that altogether the Association might congratulate themselves on the present position of affairs.

The PRESIDENT moved the adoption of the accounts and the Auditor's report. It was, he remarked, satisfactory to see that they were getting into such a good financial position.

Mr. D. ROBERTSON (Dunoon) seconded; and the motion was agreed to.

PRESENTATION TO MR. MAIN.

The PRESIDENT, in proposing a vote of thanks to Mr. Main for the labour and trouble he had taken in going over their accounts, said they were all aware that this gentleman had asked to be relieved of duty. The Committee could only accept his resignation with regret. He had much pleasure in asking him to accept the barometer they saw before them, as a small token of their goodwill. It was impossible for the Association to adequately recompense Mr. Main for his past labours; but they trusted that this gift would remind him of his official connection with the Association. He would ask them to place Mr. Main's name on their list of honorary members. He had served the Association as Auditor for about twenty years.

The proposal was unanimously adopted.

Mr. MAIN thanked the President for the kind manner in which he had spoken of his past services to the Association, and the members for the hearty manner in which they had responded. They had conferred upon him a very high honour in electing him an honorary member of the Association. He had also to thank them for the handsome gift. His reason for resigning the position of Auditor was not because of the work. The work had always been a pleasure to him; but he had felt for some time that the funds of the Association had been growing to such an extent that the time had arrived when an accountant should fill the position. But for the unfortunate illness of their Secretary, Mr. Carlow, he would have resigned some time ago.

A LETTER FROM MR. A. BELL, SEN.

The SECRETARY (Mr. L. Hislop, of Uddingston) read the following letter from Mr. A. Bell, sen., late of Dalkeith:

I regret to say that, in consequence of bad health, I have been compelled to drop out of the ranks of our profession. I must, therefore, in accordance with our rules, resign my membership of the North British Association. I was present at its inception, and an original member; and I now wish it long life and prosperity. Should any friends care to inquire, please say my health is much improved.

The PRESIDENT moved that they also make Mr. Bell an honorary member. He had been connected with the Association since the start; and therefore he was quite worthy of having his name added to the list of honorary members.

Mr. A. WADDELL (Dunfermline) seconded; and the proposal was cordially agreed to.

PRESIDENTIAL ADDRESS.

The PRESIDENT then delivered his inaugural address, which was as follows.

Gentlemen,—In taking the chair on this occasion, it is impossible for me to allow the opportunity to pass without cordially thanking you for the high honour you conferred upon me in electing me your President. I appreciate that honour more highly than I can express; while at the same time I am deeply conscious of my inability to competently discharge the important duties which necessarily devolve upon me. In a word, permit me to say that I shall perform those duties to the best of my ability, and confidently rely upon your generous sympathy and co-operation for the rest. With such assistance, I feel sure our annual meeting will not be less successful than the many brilliant gatherings which have preceded it.

I feel it my duty to refer to the loss the gas industry at large has sustained by the death of Sir George Livesey. As you are all aware, a fund has been raised for the purpose of endowing a Chair of Gas Engineering and Fuel in Leeds University, as a memorial to the late chief of the gas profession. The endowed professorship should greatly benefit all young men who are privileged to take the course of instruction specially adapted to the needs of the gas industry; and I feel confident you will approve the action of your Committee in granting the sum of thirty guineas from the funds of the Association towards this object.

CARBONIZATION METHODS.

Although it is quite true that the various methods and processes involved in our business of gas manufacture and supply were never at a more interesting stage of improvement and development than is now the case, I hope you will bear with me if I content myself by directing your attention in the direction of carbonization methods, as being the most live of the many live

questions of interest to us at the moment. During the past few years, many departures have been made from the old methods of carbonization in horizontal retorts; and we are now confronted with quite a number of recognized improved methods as carried out in the vertical retorts, inclined retorts, and chamber settings. Gas engineers who in the near future contemplate extending or reconstructing their carbonizing plant are brought face to face with a very difficult problem in deciding which form of carbonizing plant to adopt. While every gas engineer welcomes any fresh information regarding improved plant, still the questions of relative comparisons of working results, capital costs, and working expenses of the various systems are so misleading and unsatisfactory as to make the selection of any one system very difficult to decide upon.

Were it possible to test all the various systems of carbonizing plant in any one locality using the same coal, the difficulty of making comparisons would be greatly minimized; whereas, as a matter of fact, the various new systems of carbonizing plant are situated in different localities, using different coal, and working under different local conditions. It is, therefore, quite apparent that any comparisons made would be misleading. We are, however, greatly indebted to those engineers who have done so much pioneer work to improve the carbonizing plant and bring it to such a state of perfection as to render the success of the vertical retort, inclined retort, and chamber settings assured.

Although we recognize and appreciate the advancement made in the carbonizing plant of late, it must be borne in mind that very few of us have facilities at our disposal for taking advantage of the improvements which these plants effect. For instance, existing retort-houses and retort-benches have to be worked out, and, in some cases, expensive stoking machinery. Under the latter conditions, it devolves upon us to endeavour to work our existing plant to the best possible advantage, until such time as we are enabled to avail ourselves of the improved arrangements. It may have occurred to many of you that a considerable amount of information has been acquired in connection with carbonization from the results obtained in the various new systems, which can be beneficially applied in the working of ordinary horizontal retorts. I refer specially to the system of heavy charging, which has undoubtedly many advantages. It may be of interest here if I give you a brief account of a system which I adopted in Stirling about eighteen months ago, and which proved to be a very profitable one.

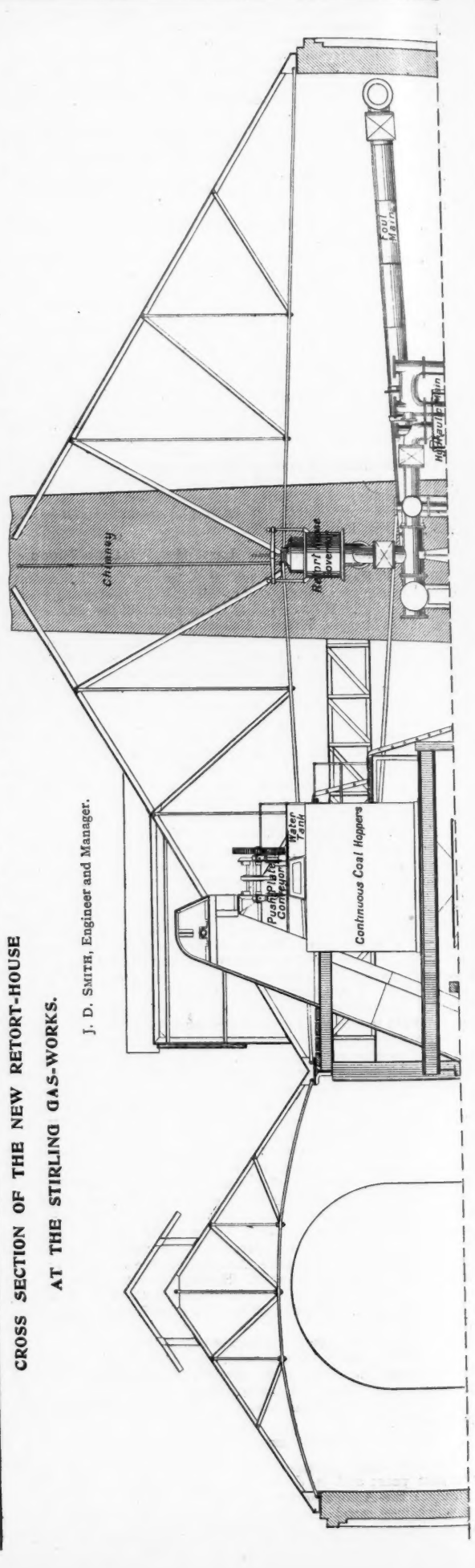
THE CARBONIZING PLANT AT STIRLING.

The latest carbonizing plant at Stirling, as most of you are aware, consists of five through ovens of eight retorts, charged and discharged by means of electrically driven stoking machinery. The retorts are 20 feet long, 22 inches by 16 inches in cross section; each oven being heated by one internal producer at the discharge side of the ovens. The ascension pipes are fixed at the discharge side of the retorts only, and are 8 inches in diameter.

A reference to the accompanying illustrations will show that the hydraulic main is of an improved type, and possesses many valuable features. The main is divided into sections; and each oven has a separate section which can be worked independently of any other. Tar-pipes are fitted to each section of the main, and are connected up to a tar-tower at the end of the retort-house. A special feature of the hydraulic main is the continuous open seal, the entire length of each section, which is sufficiently wide to permit of cleaning-out operations without in any way interfering with the make of gas. The open seal is fitted with light, loose covers, to prevent dirt and dust from getting into the main. The many advantages of the open seal will be quickly appreciated. For instance, in the event of a choked dip or bridge pipe, it is the usual custom for workmen to auger the obstructing material into the main, with the result that the tar-pipes are probably choked. There is also the great objection of allowing any thick tarry matter to remain in the hydraulic to obstruct the flow of the gas through the seal of the dip-pipes. These and other objections to the closed hydraulic main are obviated. The bottom of the main is sloped, and the tar-pipe at the bottom of each section is always open when that section is in use. This ensures that all tarry matter is displaced from the main, and the dip-pipes sealed in liquor. The seal of the dip-pipes is regulated at the tar-tower only.

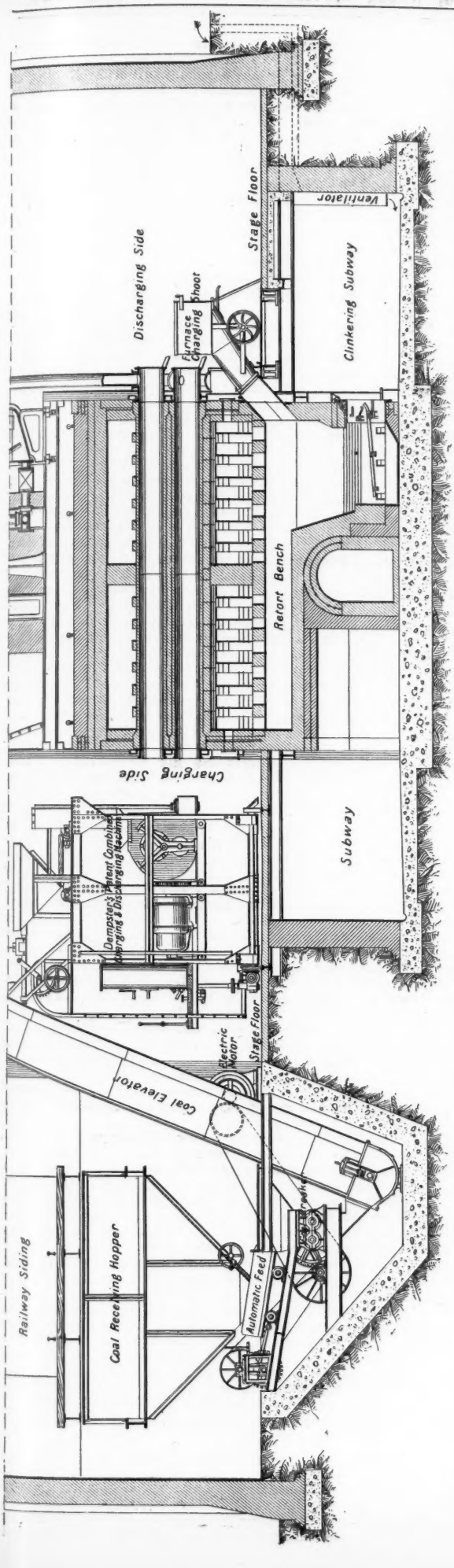
The open seal also enables the depth of the seal of the dip-pipes to be checked frequently with a minimum of trouble; and the level of the entire main can be checked in a few minutes by the aid of a graduated dipping-rod. The dip-pipes are sealed ½-inch in the liquor of the hydraulic main; the mouths of the dip-pipes being turned to almost a knife-edge, in order to lessen the friction and resistance to the flow of gas when passing through the seal. A Cowan retort-house governor is fitted on the foul main, close to the hydraulic main, which enables the seal of the dip-pipes to be reduced to a minimum, owing to the steady action of the governor. The governor is adjusted to maintain a draw or vacuum in the hydraulic main from 1-10th to level gauge; and I find it works admirably under that range.

It occurs to me that the advantages of the retort-house governor are not sufficiently well known, or not credited by many gas managers; otherwise many more of these governors would be installed in gas-works throughout Scotland. It may be the opinion of many that these governors are only adaptable to large or medium-sized works; but I see no reason why they should not be a success in the smallest works, where an exhauster is in use.



CROSS SECTION OF THE NEW RETORT-HOUSE AT THE STIRLING GAS-WORKS.

J. D. Smith, Engineer and Manager.



It is my humble impression that no piece of gas manufacturing apparatus has done more in recent years to improve carbonizing results than the retort-house governor. In fact, I look upon the governor as being a safety valve, as overdrawing by the exhauster is entirely prevented. This advantage is in itself surely a boon to the gas manager's peace of mind—not taking into account the fact that an increase of 500 cubic feet of gas per ton of coal may be obtained by the proper use of this piece of plant.

The stoking machine was made by Messrs. R. Dempster and Sons, of Elland, on Toogood's patent. This machine has been fully described in the Technical Press on previous occasions.* I might, however, say that it has given us every satisfaction, and more than realized our anticipations. With this machine, we can rely on obtaining perfectly level charges, and it is a machine which, if we desire it, will enable us to completely fill the retorts—being well adapted for this purpose. The machine is supplied with coal from overhead bunkers, which are filled by means of an elevator and overhead conveyor from our coal-stores.

SYSTEM OF CARBONIZING AT STIRLING.

Having given you a brief description of the Stirling carbonizing plant, I shall now endeavour to describe the system of carbonization which I find most profitable. At the outset, I may state the system consists in charging heavy, and allowing the charge sufficient time to burn completely off with moderate heats. Coking coal only is used, and the weight of each charge is from 8 to 9 cwt. The heats are regulated to burn off this weight of coal in six hours. During last winter, by working on this method, the retorts were capable of making about 17,000 cubic feet of gas per retort per diem. The advantages of this method of heavy charging are many. In the first place, a substantial increase in the make of gas per ton of coal is obtained, as is also an increase of from one to two candles in illuminating power; the coke is of a very superior quality; and the tar is comparatively thin and oily. Another advantage is the largely increased yield of ammonia; this increase amounting to about 25 per cent. Stopped ascension pipes and naphthalene troubles are practically *nil;* and the operation of scurfing retorts is reduced to a minimum.

The working results obtained for the year ending May 15 last may be of interest to you, as the method just described was strictly adhered to during the whole year. The figures are given below. In passing, I may mention that the coke sold per ton of coal is screened coke only, and does not include breeze—all the latter being consumed in the works' boilers. Since the end of our last financial year (May 15), I have been experimenting on eight-hour charges, increasing the weight of the charges from 9 to 10 cwt. The results obtained up to the 12th inst. are appended.

	Year to May 15, 1909.		May 16 to July 12, 1909.
Coal carbonized, tons	12,225	..	1113·2
Gas made, cubic feet	135,323,000	..	13,122,000
Benzol used, gallons	9190	..	1247
Benzol used, gallons per ton of coal carbonized	0·75	..	1·11
Coke sold, tons	6226	..	578
Coke sold, cwt. per ton of coal carbonized	10·18	..	10·38
Tar sold, gallons	110,798	..	10,796
Tar sold, gallons per ton of coal carbonized	9·06	..	9·69
Sulphate of ammonia sold, tons	146	..	16
Sulphate of ammonia sold, pounds per ton of coal carbonized	26·75	..	32·19
Illuminating power supplied, candles	20	..	20

In looking over the carbonizing figures for six-hour and eight-hour-charges, it must be admitted that the carbonizing capabilities of the horizontal retort are not yet exhausted; and, therefore, further experiments with the horizontals may lead to results equal to those obtained in the new forms of carbonizing plant.

ILLUMINATING AND CALORIFIC POWER TESTS.

Dealing with the illuminating power and calorific value tests, I have no doubt that every Scottish gas engineer will welcome and appreciate the proposal of the Council of the Institution of Gas Engineers, in conjunction with the Gas Companies' Protection Association, to promote a Bill in Parliament for making the No. 2 "Metropolitan" burner the test burner. Should the promoters of the Bill be successful in getting it passed, the advantages of such a Bill would be beneficially felt in Scotland. Only nine gas-works in Scotland supply gas under 20-candle power. I have compiled the following table showing the illuminating power supplied by almost all the gas-works in Scotland:—

Candle Power Supplied.		Number of Works.	Candle Power Supplied.		Number of Works.
16	..	2	24	..	48
17	..	2	25	..	45
18	..	2	26	..	15
19	..	3	27	..	13
20	..	24	28	..	11
21	..	11	29	..	2
22	..	34	30	..	7
23	..	16	over 30	..	4

From the table it will be observed that the progress of reducing the illuminating power in Scotland is very slow, considering that the incandescent form of gas lighting is now almost universally adopted. At the present time such a high illuminating power is simply wasteful and extravagant. The union jet test-burner is also a great handicap to many gas undertakings in Scotland; and

* See "JOURNAL," Vol. XCIX. p. 824.

the sooner it is superseded by the No. 2 "Metropolitan" test-burner, the better it will be for all concerned.

The gas industry is indebted to the Gaslight and Coke Company (of London) for the progressive step they have taken in submitting to a calorific value test being included in their recent Act of Parliament.

While we may deprecate the precedent of submitting to the imposition of an additional test for calorific value without being relieved of the illuminating power test, still I have no doubt the recognizing of the calorific test is the first step towards the abolition of the illuminating power test; and if it is necessary that we should have some sort of test, I consider the calorific value one to be the most suitable. In these days of keen competition, I regard the imposition of these tests as a hardship on gas undertakings. It stands to reason that consumers would purchase their light, heat, and power where they got the best value for their money; and, therefore, I consider the owners of gas undertakings would make it their business to supply gas to their consumers of such a quality as to give them the best satisfaction, without being compelled by Act of Parliament to supply gas of a stipulated quality.

PROPOSED REVISION OF THE ASSOCIATION RULES.

Gentlemen, I now wish to allude to another matter. The subject I desire to introduce is, to us, as an Association representing the great gas industry in Scotland, one of supreme and vital importance. I refer to the proposed revisal of the rules and regulations, as recommended by the Committee at the last annual meeting of the Association. When the Committee made this important recommendation, and asked the members for power to proceed with the work, they fully realized the difficulty and delicacy of their self-imposed task; but having the future success of the Parent Gas Association at heart, and realizing the position into which the affairs of the Association had drifted, the Committee, with commendable spirit, immediately turned their attention to the business of reorganization—determined to overcome all difficulties and prejudices in their endeavour to secure for the Association a rejuvenated constitution.

The Committee entrusted with the work of revisal have now completed their task. They have devoted much time and thought to the new rules; and the result of their labours is a most excellent production—worthy of general approval. A careful perusal of the rules will convince us that the Committee have produced a work which should stand for years to come, a most efficient guide to the Association, its Committee of Management, and its salaried officials. Assuming that you have all carefully perused the new rules, and noted wherein they differ from the old, I shall not trouble you with a lengthy statement; instead, I will make a few simple observations just as we proceed. As a preface, it is well to remember the fact that the Committee have incorporated in the new rules all the characteristics of the old ones; indeed, so much care has been exercised in the retention of these old characteristics, that it might well be said that the new rules are simply an elaboration of the old ones to suit the altered conditions of the times. The Committee have also kept in view the fact that the old rules were not sufficiently comprehensive and expansive. It is common knowledge that the old rules of our Association were not on a level with the rules of other Associations of equal importance; and, as a consequence, our Association suffered by comparison. Under the old rules, the object of the Association was limited in the extreme; and its Committee of Management was powerless to act in times of emergency. Under the new rules, however, the object of the Association, though clearly defined, is nevertheless almost unlimited; and the Committee, having the power, may act promptly at all times in the name of the Association. The duties and powers of the Committee, or, as we prefer to call it, the Council, the Secretary and Treasurer, and the Auditor, as well as the mode of procedure at general and other meetings, are now more fully and clearly defined, and much good is expected to follow the change.

A careful perusal of the new object of the Association reveals a great potentiality for good lying dormant and ready to hand; and it is hoped that, in years to come, this instrument, in the hands of a wise Council, will play no mean part in furthering the interests of the gas industry generally. Some time ago we were all on the *qui vive* regarding the Railway Companies' new demurrage charges. Unfortunately, under the old rules, the Committee were powerless to act on behalf of the Scottish gas industry. Under the new rules, however, the Council could, if considered necessary, take whatever action they thought best for the general good. There are other ways in which the Association, through its Council, could help gas concerns; and I may mention one by way of example. Supposing a gas company intended to contest a legal point, or to apply for a Parliamentary, Board of Trade, or other concession, and found it necessary to obtain the support of the Scottish gas profession in the prosecution of their case, the Secretary, with the concurrence of the manager of such a company, could communicate with the officials in charge of the Association, and in due course a meeting of the Council could be held to consider the gas company's communication. If, in the Council's opinion, the point at issue was one which, whether gained or lost, would materially assist the gas industry, then the Council could, without cost to the Association, inform and assure the contending gas company of the moral support of the members of the Association.

The rules forming the constitution, and those relative to the contributions of members to the funds, call for no comment; but rules 15 and 18 (relative to the privileges of membership and the admission of visitors to meetings) may be noted. Rule 15 is a very desirable one, and permits the Association officials to remit the payment of the annual subscription and all arrears, if any, to any member who, for causes specified, may be unable to pay his contributions to the funds of the Association. Rule 18 makes it impossible for any person, excepting members and visitors invited by the President, to attend meetings of the Association. The Committee felt that there has been too much of the unassociated commercial element at our meetings, and that the interests of the extraordinary members were not sufficiently protected. I am afraid the only course left open to commercial gentlemen, if they would like to attend our meetings, is to become enrolled as extraordinary members.

According to rule 23, honorary members may now be admitted by a two-thirds majority; under the old rules a unanimous vote was necessary.

We now come to the section dealing with the election of councillors. You will observe there are considerable changes in this section. The first change of note is to be found in rule 30. It is stated that two councillors shall retire annually; according to the old rules three members retired annually. The difference is, that members of Council will now sit for three years, as compared with two years formerly. In reviewing this change, it should be noted that in future the Secretary and Treasurer will not be a member of Council, and will have no vote in the affairs of the Council. The old and new rules both agree that a retiring councillor shall be ineligible for re-election during the following year. In order to maintain the Committee always at its maximum strength, rule 37 has been drafted to enable the Council to deal with a vacancy promptly. This is a wise precaution, and the point need not be elaborated. Under this rule, the Council have also power to temporarily fill up a vacancy in the presidency between any two annual general meetings. Rule 31 permits a President or Vice-President to remain in office for two years consecutively; but this is a prerogative the Council would only exercise upon very special occasions, and under exceptional circumstances. This rule further stipulates that a retiring President is ineligible for re-election to any office for a period of two years. It will be noticed that in future the salary of the Secretary and Treasurer is to be paid entirely out of the general fund of the Association. This is provided for by rule 34. In the past, the salary was paid in part out of all the funds of the Association.

It is, I think, well known to you that attempts have been made at various times to better the system of electing members to office. Those attempts to alter and improve the old 27th rule clearly indicated that dissatisfaction existed with the present system; and it was only a question of time when a radical change would have to be made. When we consider that our Association has on its roll 171 ordinary members, and only from 40 to 50 take the trouble to return their voting papers, it is proof, we think, that the system in vogue is either wrong, or that the members have lost all personal interest in the affairs of the Association. We are of opinion that both are at fault; but there must surely be a remedy. The remedy, we believe, will be found in the adoption of a system which will always ensure a vote being recorded by every member attending the annual meeting. Such a system is proposed in rule 35; and, if adopted, it would broaden the basis of representation, and secure that interest in the affairs of the Association which has many years been lacking. Rule 35 has been carefully drafted. The Committee are strongly of opinion that it is a proper substitute for the old one.

The powers proposed to be delegated to the Council are plainly specified in rules 38 to 46; and the duty of appointing a Revisal Committee falls to be performed by the Council under rule 42, section (*f*). Rule 44 is a new rule, and everybody will admit a very proper one. The duties of the Secretary and Treasurer are fully sketched in rules 47 and 48, and prohibit this official having a vote in the affairs of the Council.

The necessity for the proposal now before you is very real. Because the old constitution of the Association has appeared for so long to be sufficient for all purposes and for all times, it is not proof that we do not now require to remodel our constitution, and otherwise put our house in order. Just as the times have changed, so also have we changed, and so also must our institutions change if progress be aimed at. It is our desire, therefore, that the Association should be brought into line with the times; for only by such a step can we hope to retain our place worthily among the other healthy and progressive institutions of the gas industry. If it is also your desire to see the Association progressive, and, at times aggressive, if need be, then you must provide the Association with the means of modern existence, and the machinery to drive it. In all ages, and at all times, in affairs of State, as well as in the simpler affairs of everyday business and social life, it has often been found necessary to ring-down the curtain upon old and familiar, though decadent, scenes, that it may be again raised to display new scenes better fitted to the times, and modern in form as well as in spirit. Such changes are inevitable, and not even our Association can escape.

Mr. A. WADDELL proposed a vote of thanks to the President for his able, lucid, and interesting address. What the President had given them in the matter of his retorting was, in itself, a very simple way of gaining his object. They saw, from the figures, a great deal was gained by simply charging the retorts much fuller than they had been doing in the past. This, he believed, a great

many people were prepared to consider nowadays. He thought it had gone beyond question, and had become a practical fact. The President had also given them a clear description of the rules as they were now proposed to be put before them; and there, again, no doubt his views would meet with the hearty approval of the whole of the members. Any discussion which might arise on a few points relating to the rules was just what the President and the Committee expected; the whole Association ought to congratulate themselves upon the bringing forward of the proposed new rules.

The PRESIDENT thanked Mr. Waddell and the members for the vote.

DISCUSSION ON RULES.

A discussion next took place on a series of rules and regulations which were laid before the meeting by the Committee.

The PRESIDENT said he had dealt largely with these rules in his address; and he did not think there was anything else he could say in connection with them, and he moved approval of the new rules.

Mr. A. YUILL (Dundee) observed that the rules proposed that the appointment of the Secretary should be left entirely in the hands of the Council. He knew it was a debatable point with some members whether they ought to have the Secretary outside the Association. He felt strongly that they ought to have a Secretary from among their own number. They had plenty of young men who were able and willing to serve them. It should be clear and well defined whom the Council should have the right to appoint. If they passed the rules as they stood, complete power would go to the Council. The rule to this effect should not be adopted as proposed.

It was agreed to take up the rules *seriatim*. Most of them were adopted as proposed, and some with modifications.

Mr. J. W. NAPIER called attention to the proposal to give power to the Council to invest the funds of the Association in, among other things, companies; and, after discussion, it was agreed that moneys should only be invested in trust securities.

Upon the section headed "Constitution," Mr. ALEX. WILSON (Glasgow) said it was proposed that extraordinary members should consist of "gentlemen either actively engaged in the pursuit of business, or directly associated, or interested in, companies, firms, or concerns doing business with gas-works." He thought that the rule was too wide. He spoke for a good many; and it seemed to be also the President's opinion that there had been too much of the commercial element attending their meetings in the past. He would propose that extraordinary members should consist of "gentlemen who, as principals of firms," &c. If they only admitted principals, they would really get the best of the gentlemen who were connected with trade to attend their meetings, and would keep out those to whom personally he had no objection, but who had led to trouble in the past. He thought the trouble could best be avoided at a time like this, when they were considering new rules. He would not interfere with those who were already extraordinary members, but would have the rule passed for future guidance.

Mr. YUILL supported Mr. Wilson's proposal so far; but he pointed out that in large trusts the principal was sometimes only a figurehead. He suggested that the words should be "as principals or managers."

Mr. WILSON had no objection to the words being added; and the clause, as amended, was agreed to.

Clauses were agreed to proposing that subscriptions should be graded according to the make of gas. Members whose annual manufacture did not exceed 10 million cubic feet to pay 7s. 6d.; members between 10 and 20 million cubic feet, 10s.; and members above 20 million cubic feet, 12s. 6d. Extraordinary members to pay £5 on election and 12s. 6d. yearly. In all these cases, a proportion of the subscription, amounting to 2s. 6d., to be applied to the Benevolent Fund, and the balance to the General Fund. Associate members to pay 5s. to the General Fund.

The new rules proposed that the Secretary should "not necessarily" be a member of the Association.

Mr. YUILL moved that the words "not necessarily" be deleted.

Mr. M'LUSKY seconded; and the motion was agreed to.

After the clauses had been gone over *seriatim*,

The PRESIDENT formally moved the adoption of the rules as amended.

Mr. YUILL seconded; and the rules were unanimously adopted.

ELECTION OF OFFICE-BEARERS.

As the result of the ballot, the following were elected office-bearers for the year:—

President.—Mr. A. Waddell, of Dunfermline.

Vice-Presidents.—Mr. George Keiller, of Broughty Ferry; and Mr. S. Milne, of Aberdeen.

Secretary and Treasurer.—Mr. L. Hislop, of Uddingston.

Auditor.—Mr. D. Spalding, C.A., of Glasgow.

Members of Committee.—Mr. D. Vass, of Airdrie; Mr. J. B. Scott, of Cowdenbeath; and Mr. R. Simpson, of Cambuslang.

PLACE OF NEXT MEETING.

It was decided that the meeting next year should be held in Dunfermline.

READING OF PAPERS.

The reading of papers was then proceeded with. These were: "The Installation of Carburetted Water Gas at Aberdeen," by Mr. S. Milne—see p. 316; "The Working Efficiency of High-Pressure Gas Plant at Dunfermline," by Mr. Alex. Waddell—see p. 325; and "The Latest Practical and Horizontal Retort-Settings at Falkirk," by Mr. W. Wilson—see p. 321.

CLOSING PROCEEDINGS.

Mr. W. BLAIR (Helensburgh), as Past-President, presented the President's Medal to Mr. Smith, who briefly returned thanks for the decoration.

Mr. D. VASS proposed a vote of thanks to the readers of papers, which was heartily accorded.

Mr. A. MACKAY (Montrose) proposed a vote of thanks to the Scrutineers, which was also heartily accorded.

Mr. D. ROBERTSON (Dunoon) proposed a vote of thanks to the Secretary, which Mr. HISLOP acknowledged.

Later, a company of ladies and gentlemen numbering nearly 150 dined together in the Golden Lion Hotel, under the presidency of Mr. J. D. Smith, who was supported by several of his Directors. The toast of "The North British Association" was felicitously proposed by Mr. R. G. Shadbolt, of Grantham, and acknowledged by the President. Mr. D. Macfie, of Edinburgh, proposed "Our Guests," which was acknowledged by Mr. Fleming, a Director of the Stirling Gas Company. Mr. W. Doig Gibb, of Newcastle, in response to calls from the company, expressed his sense of the honour which had been conferred upon him by their asking him to speak, and his pleasure at being present on this occasion in fulfilment of a promise made to Mr. Smith, one of his oldest friends, ten months ago.

In the evening, a reception and dance were given, in the Golden Lion Hotel, by the Directors of the Stirling Gas Company. The company was a large and brilliant one. The guests were received by ex-Provost Kinross, Mr. W. Rodgers, and Sir J. B. Smith, Directors of the Company. Dancing was kept up till about one o'clock in the morning.

On Friday, a party of about a hundred ladies and gentlemen had an excursion by motor *char-a-bancs* to Callander, going by Dunblane, Crieff, Comrie, St. Fillans, and Lochearnhead. Dinner was served in the Dreadnought Hotel at Callander—Mr. Smith in the chair. A number of toasts were pledged. The party returned *via* Doune; Stirling being reached in the evening in time to allow most of the members to get home that night. The excursion took place in dull, but, on the whole, not unfavourable weather.

Subways in the City of London.—According to the report of Mr. Frank Sumner, M.Inst.C.E., the City Engineer, on the works executed by the Public Health Department of the Corporation during the twelve months ended Dec. 31, 1908, there were in use at the close of the year 1 mile 947 yards of subways, which contained about 2 miles 693 yards of gas-mains and 1 mile 1638 yards of water-mains; the length of mains and conduits of various kinds in the subways under the control of the Public Health Department being about 13 miles 999 yards.

Exhibition of Processes for Making Gas for Balloons.—The last number of the weekly journal "Ila," which is the official organ of the International Aëronautical Exhibition at Frankfort-on-Maine, contained an announcement of a forthcoming exhibition and demonstration of processes for the production of gas for charging balloons. The processes will include those intended for stationary use as well as portable plant and apparatus for refilling balloons during an ascent. The demonstrations will take place at the time of the congress of the Associations of German Chemists and of German Aëronauts—viz., on the 14th prox. and subsequent days; and invitations will be sent to all military authorities and foreign aëronautical societies to witness the proceedings. Gold, silver, and bronze medals will be awarded to the best of the competing processes, by an International Committee of judges whose names will be announced later. Entries should be sent to the Scientific Committee of the Internationale Luftschiffahrt-Austellung at Frankfort.

The Margate Appointment.—At a special meeting of the Directors of the Isle of Thanet Gas Company held last Tuesday, Mr. Frank Higginson, the Engineer, Manager, and Secretary of the Broadstairs Gas Company, was appointed to the position of Engineer and Manager. During the nine years he has been at Broadstairs he has displayed such conspicuous ability, and his relations with his Directors have been of so harmonious a nature, that they are naturally loth to lose his services. They therefore urged him to reconsider his decision, and gave him assurances of so satisfactory a character that, after mature deliberation, he has decided to withdraw his acceptance of the Margate position. Under these circumstances, a fresh selection was rendered necessary; and the choice has fallen upon Mr. J. M. Campbell, who is at present engaged at the Luton Gas-Works. Mr. Campbell acted as Resident Engineer during the erection of a gasholder and tank at Devonport; and he described this work at length before a recent meeting of the London and Southern District Junior Gas Association—see "JOURNAL" for last February and March, pp. 317, 531, 622. Mr. Campbell's connection with the early history of this Association was one that secured for him the gratitude of many juniors in the gas profession.

HEFNER AND HARCOURT LAMPS COMPARED.

A recent number of the "Elektrotechnischen Zeitschrift" contained an article by Herr E. Brodhun, of the Imperial Physical Technical Institute (Reichsanstalt), Charlottenburg, on the relative merits of the Hefner and the ten-candle pentane lamps.

The author first points out that there are now only three of the numerous standards of light which have been proposed from time to time which have an extensive use. These are the old French Carcel lamp, the Hefner lamp, and the ten-candle pentane lamp. The Carcel lamp is still used in France, but it is surpassed by the other two standards in all the more important respects, and will evidently be superseded. The amyl-acetate lamp, as defined by von Hefner-Altenеck in 1884, has already attained very wide application. It has been generally adopted in Germany, and is used in many other countries—particularly since its acceptance by the International Electro-Technical Congress in Vienna in 1896 as the practical standard of light representing the Bougie Décimale, or tenth part of the Violle unit of light. The Harcourt pentane lamp is considerably more recent, having been first prescribed in 1898. It is used more particularly in England, where it has been adopted by the Gas Referees and by the National Physical Laboratory as the official standard of light. In Germany, however, it is so far little known; and on this account the author considers it may be useful to state and compare briefly the advantages and disadvantages of it and the Hefner lamp.

The definition of the Hefner lamp, which is simple and short, is quoted by him; but as it already appears in numerous text-books, it need not be reproduced. Then follows a brief description of the Harcourt pentane lamp, which it is likewise unnecessary to reproduce. The author goes on to say that, on using the two lamps, a number of advantages of the pentane lamp are at once apparent. The Hefner lamp has a rather red-coloured flame, and its intensity is low; therefore, it must be brought comparatively near to the photometer screen, which entails very exact measurement of the distance between the screen and the flame. The flame is sensitive to draughts; and its height must be set very exactly, as a change of only 1 mm. in the height of the flame causes a change of nearly 3 per cent. in the intensity of the light. On the other hand, the colour of the pentane flame is much whiter—approximately the same as that of a carbon filament lamp. The intensity is about eleven times that of the Hefner flame; so that for the same illumination of the photometer screen, the Harcourt lamp is placed at three times the distance of the Hefner lamp from the screen. The pentane flame is not very sensitive to draught; and its height need not be set with great precision.

Against these readily recognizable faults of the Hefner lamp, may be set several advantages which, according to Herr Brodhun, it possesses in use. For instance, the Hefner lamp is much handier and much more easily set up and put into action than the pentane lamp, which is over six times its height. The latter must be carefully levelled, and, on account of the cutting-off action of the chimney, be set so that the lower edge of the chimney is precisely at the same height as the middle of the photometer disc. Also, the Hefner lamp is, according to the tests of the Reichsanstalt, much less sensitive to vitiation of the air than the pentane lamp, which is a matter of importance having regard to the fact that photometer rooms are frequently small. The illuminating power of the pentane lamp moreover frequently shows considerable and unaccountable fluctuations (as much as 1 per cent.) in similar meteorological conditions in the course of a few hours. The Hefner lamp does not show such fluctuations. The lower price of the Hefner lamp is also an advantage.

The greater or smaller convenience in working must not however, the author continues, be taken as the most important factor in judging a unit of light. On the other hand, it should be ascertained primarily to what extent both lamps fulfil certain requirements with which a good standard of light should comply. The chief requirement is that it is capable at any time of being produced, as conveniently as possible, of exactly the same value. In the case of these two lamps, this entails that the lamps must be readily reproducible, and that the fuel must be capable of manufacture of the same composition always. The first of these two requirements is fulfilled by the Hefner lamp very completely. It is only of importance with it that the prescribed dimensions should be maintained in regard to the German silver wick-tube, of which the thickness of the walls is specially important; and, secondly, that the method adopted for measuring the height of the flame should give that height correctly. The dimensions of the wick-tube may be easily checked, and the height given by the flame measurer can at any time be tested by the gauge which is provided with each lamp. On the other hand, a great number of dimensions have to be observed with the pentane lamp. The effect of deviations from the prescribed measurements has not been established in detail by exact experiments; and the complexity of the lamp would make this investigation a very difficult one. It may be feared that the fine orifices of the burner will be partially blocked in course of time, and that the illuminating power will be thereby altered. These considerations agree with practical experiences.

At the Reichsanstalt, up to the present time, nearly 700 Hefner lamps, with Visier flame-measurers, coming from different works have been tested. In no one of them has a deviation in illuminating power from the standard of the Reichsanstalt been detected when the dimensions were correct. This is not the case with the pentane lamp. Recently the Reichsanstalt was furnished by the National Physical Laboratory with a ten-candle pentane lamp for experimental purposes which it was stated had 0·4 per cent. less illuminating power than the standard of that laboratory. Mr. Paterson of the same laboratory has also reported that, according to his investigations, new pentane lamps have a lower illuminating power than old ones. (See "JOURNAL," Vol. XCIX., p. 223.) He has at times found a difference of 0·75 per cent. between an old and a new lamp. He could not give a reason for the difference, but thought that it might be due to a change in the radiating surfaces of the lamp in course of time.

In regard to the fuel, the Hefner lamp uses amyl-acetate which is a simple, well-defined chemical substance which can be manufactured, without difficulty, of adequate purity. There are simple methods of testing the purity of the amyl-acetate. It may be stored for a long time without change. On the other hand, pentane is not a simple body, but a mixture of different isomers having different boiling points. It has not hitherto been carefully determined what effect a difference in composition of the pentane has on the illuminating power; and this would be difficult to ascertain definitely. This view is supported by a consideration of the prescription given by the Gas Referees for the manufacture of the fuel. It is described as consisting chiefly of pentane, together with small quantities of lower and higher homologues whose presence does not affect the light of the lamp. The last statement appears to require substantiation. The specific gravity of the pentane should lie between certain limits; and if the containing vessel is not tightly closed, or is frequently opened, the more volatile constituents distil off, the specific gravity is raised, and the fuel no longer complies with the prescription. Pentane which was sent from England to the Reichsanstalt for photometric purposes had too high a specific gravity, and consequently did not comply with the prescription, because, notwithstanding that the containing vessel was apparently well sealed, a fraction of the liquor had evaporated.

These considerations, the author says, lead to the conclusion that a constant illuminating power cannot be obtained with the same certainty by means of the ten-candle pentane lamp as by the Hefner lamp. Anyone who has worked with a Hefner lamp knows its faults, and knows that a more convenient standard of light is desirable; but so long as we have only the present standards of light (and choice therefore practically rests between the Hefner lamp and the pentane lamp), there can be no doubt that the Hefner lamp has the advantage, as the pentane lamp is lacking in the most important properties of a good unit of light—viz., ready and certain reproducibility, and a uniform well-defined fuel.

INDICATING OF GAS-ENGINES.

At the Summer Meeting of the Institution of Mechanical Engineers in Liverpool last week, a paper on the above subject was submitted by Professor Burstall, of the University of Birmingham. He pointed out that in the report of the Standards Committee on Gas-Engines of the Institution of Civil Engineers, the opinion was expressed that the indicating of gas-engines was open to very much greater errors than was the case with steam-engines, and that they therefore preferred to draw all their conclusions from the studying of the brake-horse-power. The matter was considered by the Research Committee of the Institution of Mechanical Engineers; and, in order to determine what the error amounted to, it was decided to use two indicators simultaneously—one being the ordinary string type, and the other the optical indicator. The results given in the paper were purely comparisons of indicators, as it was found that after the experiments had been concluded the cylinder of the engine was very badly oval, and a considerable amount of leakage was taking place to the differential piston, which vitiated the results as regards efficiencies. But as the indicator diagrams were all taken simultaneously, the comparison of the indicator was not affected. The engine experimented upon had a cylinder 16 inches in diameter by 24 inches stroke, running at 165 revolutions per minute under full load.

The result of the comparisons, while not furnishing absolute proof of the accuracy of either of the indicators, afforded strong evidence that both were giving results very close to the truth. They are entirely dissimilar types—one multiplying the motion of the indicator piston by 6, and the other by about 120; and a very similar multiplication is the case with the rotation of the drum and the mirror. The two give results to within 3 per cent. of the mean pressure, and very nearly the same figures for the initial pressure; and the author thought this was good presumptive evidence that when either indicator is used with the precautions described in the paper the results obtained are at least as accurate as any other measurement that can be made in engine testing. But he emphasized the point that unless these precautions are taken when obtaining indicator diagrams, the results should only be looked upon as affording a clue to the valve-setting, and not as giving any reliable figures as to the power developed in the engine cylinder.

The Oswestry Gas Company have lately sustained a loss by the death of their Chairman, Mr. William Jackson, who left estate of the value of £14,104.

FIRST INSTALLATION OF DESSAU VERTICAL RETORTS IN THE UNITED STATES.

The current number of "Progressive Age" contains the following article by Mr. F. J. Mayer, giving a description of the installation of Dessau vertical retorts in course of construction at the new works of the Providence (R.I.) Gas Company at Sassafras Point. It is based upon particulars furnished by Mr. J. W. Ellis, the President of the Company.

The location furnishes a most favourable site for the new plant, being easily accessible both for water and rail shipments. Coal will be delivered almost by water shipments exclusively. The carbonizing plant will consist, for the first unit, of four batteries of six benches, having ten vertical retorts each, all constructed on the Dessau system. Two of the batteries will be installed at once; but the retort-house will be of sufficient dimensions to contain the four forming the first unit. The entire producing capacity will be 3½ million cubic feet of gas per day.

The coal will be handled to the storage-bins, located in the retort-house immediately above the benches, by machinery of the most approved and latest design, either from the coal-barges direct or from storage after having passed through suitable crushers located in the elevator tower, which latter is placed at a distance of 24 feet from the gable end of the retort-house. The elevator tower is immediately adjacent to the covered storage-shed, and the latter is parallel with the water front. All the coal is charged by gravity—excluding all machinery. Suitable measuring hoppers are provided for the charging of the coal, travelling over the retorts in a longitudinal direction. Additional hoppers run on suspended rails on a centre line between the longitudinal row of retorts, supplying breeze to the bottom of the retorts for preventing the charge of coal coming into contact with surfaces of the retorts which are not exposed directly to the action of the fire.

The hot coke is discharged from the lower end of the retorts through a movable shoot into the conveyor, to be transferred to the end of the retort-house, and from there into an automatic skip-hoist, by means of which the coke is elevated and discharged into the night storage-bin. The final disposition of the coke from this bin is accomplished by means of the telpherage system, by which it is transferred to the yard. If rail shipments are desired, the coke is discharged immediately from the bottom of the elevated night storage-bin into the railroad cars. For the breeze supply to the bottom of the retorts, as well as for the coke supply to the generator furnaces, there are located in an elevated position alongside the gable wall nearest the night storage-bin, on the inside of the retort-house, storage-bins of suitable capacity for the purpose intended. For the coke supply to the generator furnaces, suitable hoppers travelling upon a suspended rail immediately over the centre of the charging-holes are provided. The coke for the furnaces, as well as the breeze for the retorts, is returned to the retort-house by side dumping-cars elevated upon a platform elevator, located at the end of the retort-house, to the top of the coke and breeze storage bins.

All the coal and coke handling machinery is of the latest type, and so arranged that a minimum of attention is required in its operation. It is actuated by electric power supplied by a direct current of 220 volts.

In the design of the benches, as well as in the remaining portion of the plant, the latest details have been incorporated; and therefore the plant should give better results than the best obtained in other countries, on account of the character of the Westmoreland coal, which is particularly suitable for carbonization in vertical retorts, as has been demonstrated by tests conducted under practical operating conditions. The entire carbonizing plant, which is shown in the accompanying illustrations, has been designed and is being executed by the Didier-March Company, of New York.

Retort-House.

The retort-house has a width of 80 feet and a length of 215 feet, a height to the eaves of the roof of 31 ft. 6 in., and a centre height to the ridge of the monitor of 65 feet. The total carbonizing capacity of the house, as already stated, is 3½ million cubic feet of gas in 24 hours. In designing it, particular consideration was given to its ventilation and to comfort of the operators. The roof on each side of the centre of the building is divided into two principal sections, the top section being surmounted by an open ridge ventilator. This arrangement in connection with the stationary louvres contained in the side walls, will effectually prevent any accumulation of gases or vapours produced by the quenching of the hot coke. The entire building consists of a steel structure, in which the panels formed by the various members are filled with brickwork, stationary louvres, swinging windows, and sliding doors, as shown on the illustrations.

In a longitudinal direction, the building is divided into fifteen panels, twelve of which are immediately opposite the benches. In the space occupied by the central panels is located the main stairway, from which access is had to various operating platforms. The stairways and platforms throughout the building are also constructed of steel. The two end panels provide for connection from one side of the house to the other, and also give access to the central portion of the house located between the benches. In one of these end panels (the one nearest the night storage-bin) are the overhead coke and breeze bins already referred to. In each of the panels of the side walls of the building, immediately above the floor line, are located sliding doors made in two halves, which, when opened wide, will greatly assist

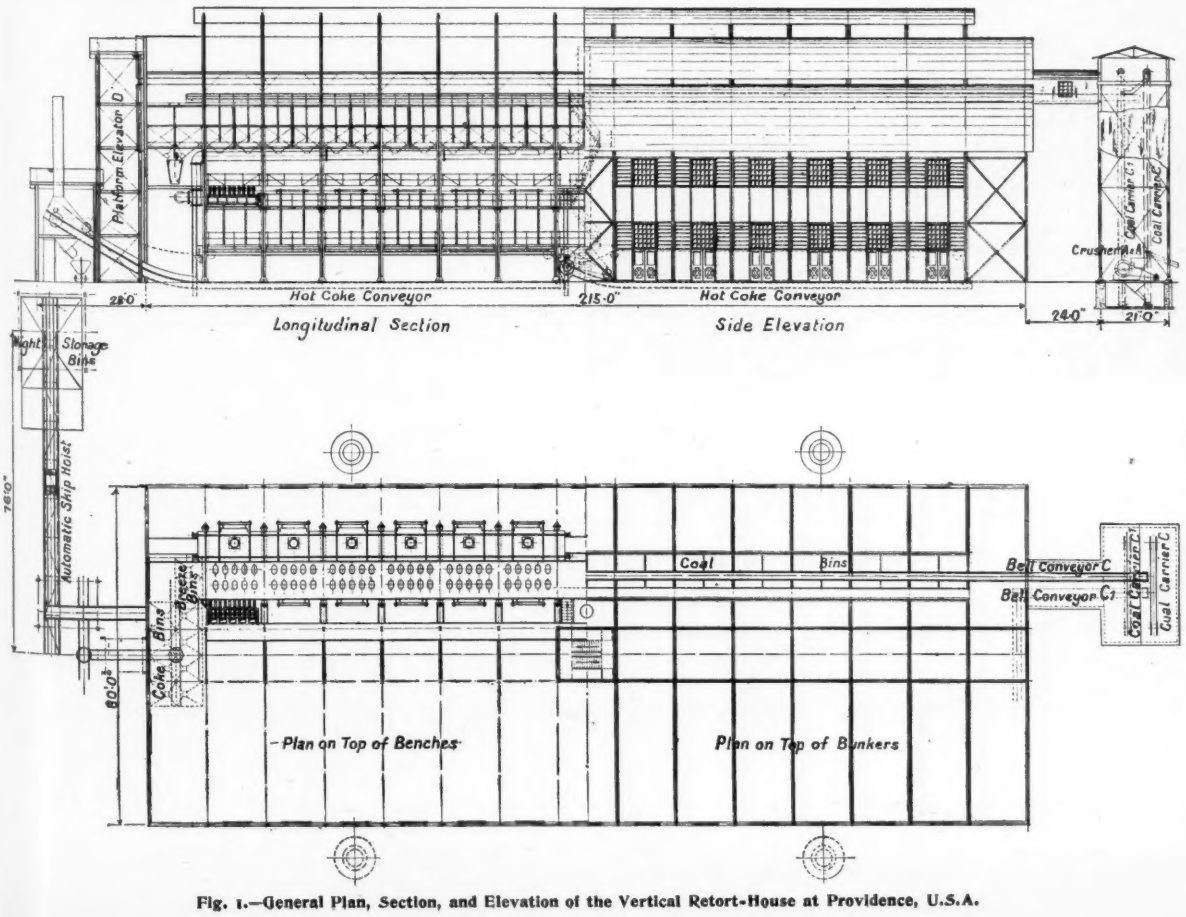


Fig. 1.—General Plan, Section, and Elevation of the Vertical Retort-House at Providence, U.S.A.

in properly ventilating the house during summer. For the support of the central portion of the roof and the coal-bins, which are placed immediately above the benches, the building is supplied with two longitudinal central rows of steel columns, which in a transverse direction coincide with the position of the columns in the side walls of the building. Transverse latticed girders constructed of steel extend from side to side of the building, and are supported by the columns in the centre and the side walls. These girders support the overhead coal-bins, which are located on a centre line of the benches. All the bins are constructed of steel plates, and are continuous, extending from end to end over the two batteries of benches. The storage-bin will be large enough for 36 hours' consumption of coal. With such large capacity, the operation of the coal-handling machinery on Sundays will be entirely avoided. It will further furnish a safeguard against any interruption in the working of the plant resulting from breakdowns of the coal-handling machinery. The bottoms of the coal-bins are inclined, and provided with two discharging valves over each of the benches—thus avoiding all travelling of the charging-hoppers after they have been filled. The coke and breeze bins are also constructed of steel plates, similar to the coal-bins. They are located, as already stated, adjacent to one of the gable walls of the house, and therefore coke-shoots supplying the generator furnaces will have to travel from the storage-bins throughout the entire length of the house. Ample time is available for this purpose, on account of the large capacity of the furnaces.

Retort-Benches.

The retort-benches will be constructed in two batteries. Each battery will consist of six benches, and each bench will contain ten vertical retorts, oblong in cross section, having a length of 13 feet. The charge of coal for each retort will be 1100 lbs., and the carbonizing time 10 hours. The gas produced in each retort in 24 hours will average 14,000 cubic feet, or a total of 140,000 cubic feet per bench. For 24 benches the total capacity will be 3,360,000 cubic feet of straight coal gas. The remainder to make up the capacity of 3,500,000 cubic feet is supplied by the production of water gas during the last two hours of the carbonizing period in each retort.

The benches are constructed upon cast-iron base-plates in an elevated position, supported by steel columns, with the exception of the generator furnace and the recuperation system; the latter starting from the top of the foundation, and extending to the top of the bench. The steel supporting structure of the benches forms also a portion of the longitudinal and transverse anchorage. The tops of the benches are covered with a steel platform, which will extend throughout the entire length of the two batteries of benches. By this arrangement, only one crew is required for the two stacks of benches. The operating platform is protected on both sides by steel rails connected to the platform by a vertical continuous flange to prevent accidents to the men and dropping of pieces of coal and coke over the edge of the platform.

The retorts are placed in two parallel rows, five retorts to the row for each bench. All the retorts are tapering towards the bottom, and the retort-chamber is so arranged that all the products of combustion pass from the chamber, located at the lower end of the retorts, in a zigzag direction to the upper portion of the bench, at which point they enter the smoke flues of the recuperative system. This extends throughout the entire depth of the generator furnace, and is divided in two sections, one on each side of the furnaces. Before the furnace gases pass to the oxide flue of the bench, they are carried round a steam developer to produce steam for the purpose of mixing with the primary air before the latter enters the furnace under the grate-bars. The space occupied by the generator furnaces and the two recuperator systems extends throughout the length of the bench. Carbon monoxide produced in the furnaces is carried to the bottom of the combustion chamber immediately around the lower portion of the retorts, and at this point intimately mixes with the preheated secondary air for the purpose of maintaining a temperature in the lower portion of the combustion chamber of 2600° to 2800° Fahr. The temperature is gradually reduced towards the top of the retorts by means of regulating devices, so that complete carbonization in all parts of the retorts is accomplished in ten hours. The lateral bracing of the retorts is such that deformation cannot occur unless the temperature is raised to such a height that the retort will fuse. The lower portion of the combustion chamber is constructed of isolating material of special design and mixture; and the lower portions of the retorts and settings are made of special materials to resist continuously the effects of the extremely high temperatures above referred to.

The upper and lower mouthpieces are provided with self-sealing lids, tightened and held in position by means of specially designed cotter bars and operating mechanism. The upper lids are operated immediately on top of the bench; the lower lids from the outside by a system of levers, racks, pinions, and chain gearing, so arranged that either of the mouthpieces can be engaged and disengaged with the mechanism from a position common to all mouthpieces for one bench. The clinkering-doors of the furnaces are located immediately above the retort-house floor, and are provided with self-sealing lids and special openings, through which are inserted the temporary water-cooled grate-bars while clinkering. Clinkering is necessary every 36 to 48 hours, depending on the character of the coal and coke.

The steel operating platform on top of the benches is fixed sufficiently high above the brickwork to admit of placing underneath the platform the gas take-off pipes, which are attached to

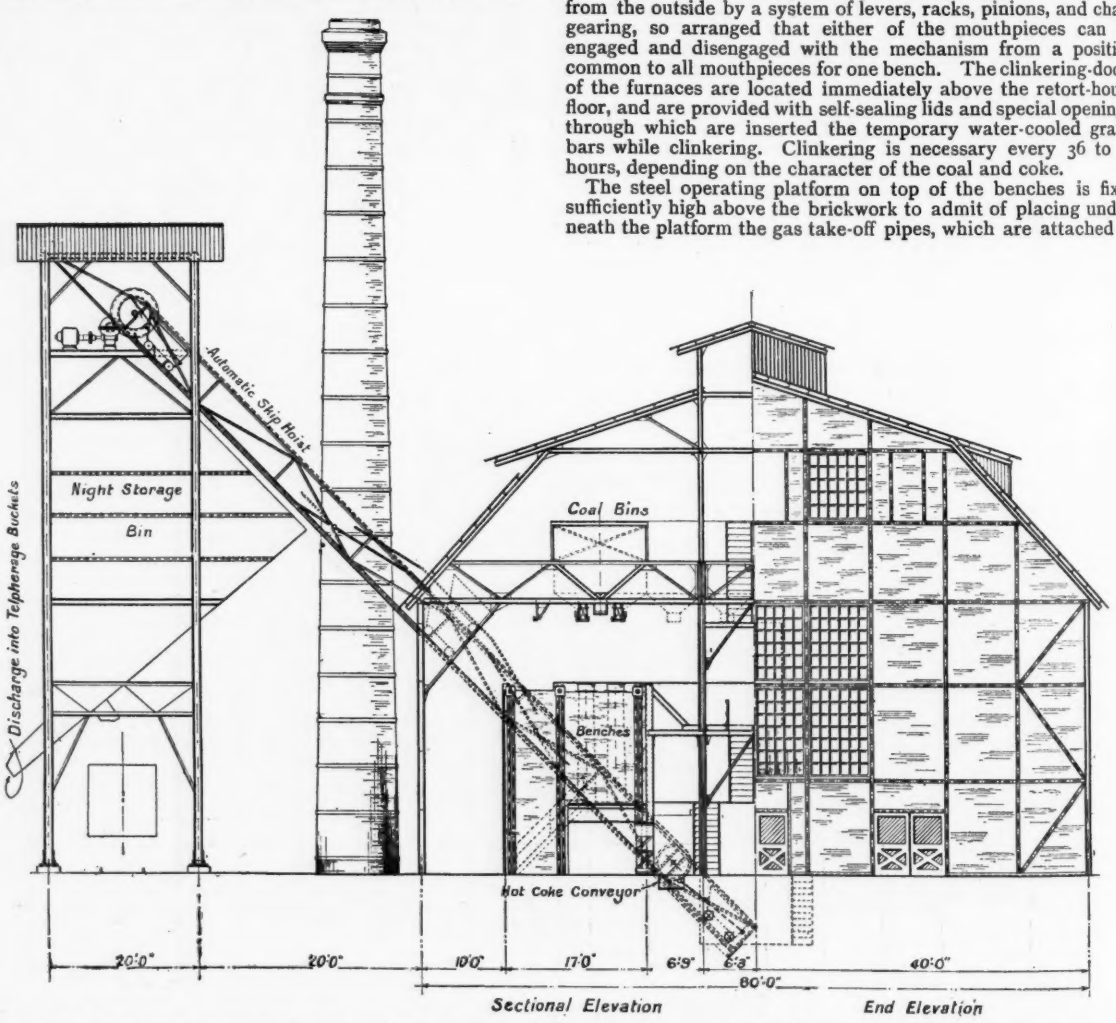


Fig. 2.—End Elevation and Cross Section of the Retort-House, Showing the Automatic Skip-Hoist and Night Coal-Storage Bin.

the side of the top mouthpieces. They are in a horizontal position, and pass to the outside of the benches, where they connect through an angular shaped dip-pipe to the top of the hydraulic main. Each take-off pipe is supplied with a self-sealing lid covering a cleaning opening so located that both horizontal and vertical portions of the pipe are accessible. The hydraulic mains are supported upon a special steel platform, and are supplied with continuous water-seals, to the top of which are attached self-sealing lids. To prevent the accumulation of solid matter which may be carried over from the retorts into the hydraulic mains, each of the cleaning openings is furnished with a removable pan, immediately under the ends of the dip-pipes.

For charging the retorts with coal, there will be used a specially designed hopper, travelling on suspended rails fitted below the bottom of the coal bins. This hopper is suspended immediately over the centre line of the retort-setting. It is supplied at the lower end with an ingenious device, permitting the charging-funnel to be transferred from the mouthpieces of the retorts on one side of the bench to those on the opposite side. The lower portion of this funnel terminates in a specially designed cone, which automatically distributes the coal entering the retorts, so that the fine coal will be deposited immediately adjacent to the retort surfaces, while the coarse coal will form the centre core of the charge. With this arrangement, a larger number of void spaces in the core of the charge are provided for than those which exist in any other portion. Through these void spaces the largest portion of the gas is carried off, as it offers the least resistance; and the gases are passed through under very much lower temperatures than those existing adjacent to the inner retort surfaces. This arrangement prevents decomposition of the hydrocarbons, and accounts for the increase in yield and candle power.

The coal-charging hoppers, as well as the breeze and coke hoppers, are all supplied with anti-friction roller bearings. The breeze-hoppers are similar in description to the coal-hoppers, with the exception that they are suspended from a single rail instead of two rails. The breeze-hoppers are provided with a measuring and charging device so constructed that the quantity of breeze which is put into the bottom of the retorts will only fill the lower mouthpieces and such portion of the retort as is not exposed to the direct action of the flame. The breeze thus charged into the lower mouthpieces is not lost, but is recovered in the shape of coke, due to the fact that a portion of the heavy oil is absorbed by the breeze, converting it into large and dense pieces by the radiant heat from the incandescent coke during the latter period of carbonization. For the charging of the generator furnaces with coke there is supplied a cone-shaped hopper, travelling on a single rail immediately above the centre of the charging-holes, as already stated.

For each battery of benches there will be constructed a chimney of radial perforated bricks, 4 feet in diameter and 125 feet high. The chimneys will be immediately outside the retort-house, and opposite to the centre of each battery of benches. They will be connected to the main flue by a transverse flue, both located below the floor.

Coal and Coke Handling Machinery.

The coal will be taken either direct from barges or from the open or covered storage to the retort-house, after having been passed through suitable crushers. These will be so arranged that only the coarse lumps are passed through, while the fine coal is diverted directly to the gravity coal elevator installed in a special steel structure, situated at a distance of 24 feet from the gable wall of the retort-house, as shown in fig. 1, with the exception that the structure containing the elevators will be increased in length, so that the coke conveyors located over the storage-bin inside the retort-house may both be passed in a straight line to the point of discharge immediately under the top run of the carrier elevator. From the carrier conveyor the coal is discharged upon belt conveyors fitted immediately above the coal storage-bins, extending throughout the entire length of the retort-house. The belt conveyor is supplied with an automatic tripper, in order to procure a continuous and uniform deposit throughout the entire length of the bins. The arrangement of the carrier conveyors is such that either of them can supply coal to both sides of the retort-house. The capacity of the coal-handling machinery is such that the coal required for 24 hours' operation can be delivered within three hours. This apparently large capacity for present requirements is due to the fact that the machinery will supply a second house of 3½ million cubic feet capacity in the future.

For the removal of the coke and its disposition, there will be supplied for each battery of benches a hot-coke conveyor of the De Brouwer type, with automatic quenching arrangement and expansion joints in the side of the trough, to deal with the large body of coke that is suddenly discharged and the variations of temperature that exist in the upper and lower portions of the trough. The coke will be transferred from the bottom of the retort mouthpieces to the conveyor by means of movable shoots travelling upon rails placed upon the retort-house floor immediately below the discharge mouthpieces. The coke will be conveyed throughout the entire length of the retort-house to a discharge head located outside, where it is provided with a discharge pocket for the purpose of either feeding the automatic skip hoist leading to the top of the storage-pocket, or discharging into dumping cars, which return a portion of the coke by means of a platform elevator to the top of the storage-bins, which, as already described, are fixed in an elevated position immediately adjacent to the gable wall of the main building. The automatic skip hoist, together with the night storage coke-bin, are shown in fig. 2. The automatic skip hoist consists of a rectangular-shaped steel latticed girder fixed in an inclined position, extending from the discharge head of the hot-coke conveyors to the top of the storage-bin. The hoist is supplied with two dumping-cars constantly travelling in opposite directions. To prevent an undue amount of breeze resulting from the breaking of the coke by dropping through long distances, the discharge arrangement at the top of the hoist is so designed that the coke is constantly discharged over inclined surfaces, gradually filling the bin from bottom to top. The night storage or accumulating bin is an elevated steel structure, as shown in fig. 2, having sufficient capacity for 24 hours' production, in order to eliminate all labour or attention to the handling of coke outside the retort-house during the night. The bin is constructed of steel plates provided at the bottom with discharge spouts controlled by swinging valves, to permit of discharging the coke either into railroad cars for direct shipment, or into telpherage buckets for transfer to the storage yard or other portions of the plant.

A NEW LOCK FOR SLOT-METER MONEY-BOXES.

Ever restless ingenuity has brought to us a novel construction of padlock and hasp for use on the money-boxes of prepayment meters; the designer and patentee being Mr. Robert B. Reeves, of Whitstable-on-Sea. Greater security has been the dominant object of the inventor; and he has succeeded in this object, for a firmer lock for the purpose—a lock that offers to the pilferer, through its grip and stability, more resistance—has not yet been introduced to our notice. It is quite a new departure.

The illustrations show that the form of padlock which, for the comparatively new purpose of securing the money-boxes of prepayment meters, has retained many of its ancient attributes—a

Showing Lock Head Open.

Showing Lock Head Closed.

Enclosed Bolt Form—Showing Bolt Raised.

The Solid Hasp.

body with a swing hank, which passes through a hole in the hasp—has been completely discarded. Here we have a padlock in which the fastening hook (cut out of one solid piece of metal) slides into the body of the lock, and, when home, grips tightly a hasp notched top and bottom, which hasp is also cut out of one piece of solid metal. There are two forms (and two sizes) of the padlock—one in which the bolt is provided by a cross head, and, when the bolt is pressed home, the cross piece is seated on the two uprights of the body of the lock; the other in which the bolt, when pressed home, is absolutely enclosed in the uprights of the lock body. There is when fixed no open space to tempt the unscrupulous to try to force the lock by a bradawl or screw-driver; the lock sits rigidly and closely on to the face of the money-box, so that it cannot be wrenched off; nor is there anything that can tempt to the use of a file, as in the case of a padlock with an ordinary curved hank.

A key has only to be used when removing the lock from the hasp. The insertion and turning of the key cause the bolt to shoot upwards; and then the rectangular opening is made as shown in the first and third illustrations, and the padlock can be lifted off the hasp. On replacing it on the hasp, the bolt only requires pushing home with the fingers to securely fasten it. There is only one disadvantage that we can see—that is, on account of the special hasp, the application of the new padlock to meters already in existence; but upon this point Mr. J. William Glover (of Messrs. George Glover and Co., Limited, of Chelsea, who are the agents, and who have adapted the bolt to their "M & M" patent four-lever lock) satisfied inquiry by saying there would be no difficulty in fitting the special hasp when meters are disconnected for repair or adjustment. In the case of new meters, the "slot-grip bolt" form of lock and hasp can be ordered. There is a difference of but a few pence in price between the old and the new forms of lock. Strength, solidity, compactness, neatness, and increased safety, are sure to make the lock a strong claimant for favour.

INSTALLATION OF CARBURETTED WATER-GAS PLANT AT ABERDEEN.

By Samuel Milne, of Aberdeen.

[A Paper read before the North British Association of Gas Managers.]

In these days of low-grade gas, when the use of enrichers is being largely abandoned, it may be considered that a carburetted water-gas installation is somewhat out of date. It must be borne in mind, however, that a carburetted water-gas plant may be used, not only as an enricher, but as an auxiliary and an adjunct to a coal-gas plant; it has advantages which should not be overlooked—producing, as it does, a gas of any desired illuminating power in large volumes, with great rapidity, and, at the same time, subject to a nicety of control.

Aberdeen has not reached the rock-bottom in regard to candle power. Prior to the year 1881, the prescribed illuminating power was 30 candles (union jet), but that year powers were obtained for a reduction to 20 candles (union jet); and a further reduction to 15 candles ("Metropolitan" No. 2) was authorized two years ago. The illuminating power at present supplied is not less than 21 candles; so that at Aberdeen the carburetted water-gas plant is used, not only as an auxiliary, but also as an enricher.

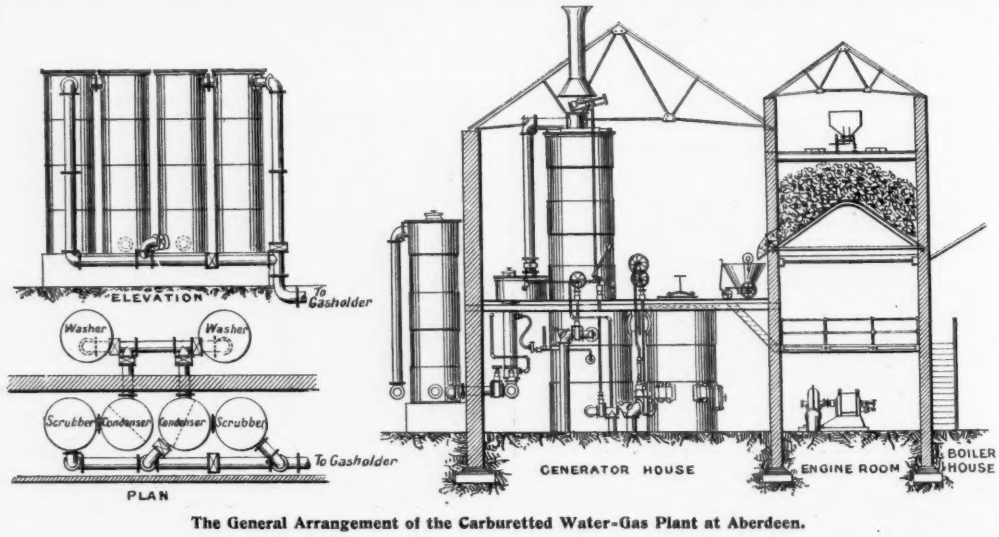
Numerous papers have been published from time to time pointing out the direct as well as the collateral advantages of such an installation; and the writer does not propose to go into these, but rather to confine himself to a description of the plant recently installed at Aberdeen. He ventures to hope that it may be of some practical value to members of the Association who may contemplate putting down an installation of the kind.

Site.—The site selected for the plant was found ready to hand. The Corporation electricity works, erected in 1893 and extended in 1896, adjoined the Corporation gas-works, and, being found inadequate and without room for expansion, being hemmed in by the gas-works, a new electricity works had to be erected in 1901 in another part of the town. The old works were subsequently taken over by the Gas Department; and one-half of the original boiler-house gave sufficient accommodation for the whole of the water-gas plant which required to be kept under cover.

Plant Adopted.—The plant adopted at Aberdeen was supplied and erected by the Economical Gas Apparatus Construction Company, Limited, under the Merrifield-Westcott-Pearson patents. With the exception of the blowing plant, it is of British manufacture, and the first of this particular type to be installed north of the Tweed.

Capacity of Plant.—The plant at present installed consists of two sets, each capable of producing 750,000 cubic feet of gas per twenty-four hours, after the carbonic acid and other impurities have been removed, and the gas corrected to standard temperature and pressure. It comprises generators, superheaters, fixing-chambers, washers, condensers and scrubbers, tar-extractor, tar and liquor separating tank, a relief holder, exhauster, purifiers, and meter; also a boiler for steam raising, air-blowers driven by steam-turbines, pumps for circulating water through the gas-condensers, feed pump for the boiler, pumps for circulating water through the washer and scrubber, and pumps for injecting oil into the fixing-chamber, as well as an elevator for coke and an oil-storage tank. The pumps and blowers are all in duplicate.

Steam-Boiler.—The steam-boiler is of the Lancashire type, 28 feet long by 7 ft. 6 in. diameter, with two flues 3 feet in diameter, each having four cross tubes, and built for a working pressure of 120 lbs. per square inch. The boiler is placed upon, and the flues are covered by, patent adjustable blocks, which provide



The General Arrangement of the Carburetted Water-Gas Plant at Aberdeen.

ready access for examination of the boiler, and, at the same time, form a strong and substantial setting.

Steam-Piping.—The main steam-pipe is of steel, and is 5 inches in diameter at the boiler, reducing to 4 inches. It is led to the engine-room, where a 2½-inch branch is taken off for the steam turbines, and a 2-inch steam-ring is carried round the engine-room to supply the various pumps. The steam-pipe leading to the generators is 2 inches in diameter, branching down to 1¼ inches to each generator. A Holden and Brooke's steam drier is introduced into the line of piping as it enters the engine-room; and Geipel and Lange steam traps are provided where necessary. It is very desirable to have dry steam both at the turbines and also at the generators.

Pumps.—The feed-water to the boiler is from the town's supply, and is led to one of Wright's patent multiplex detartarizers, where its temperature is raised to nearly 200° Fahr. by the exhaust steam from the steam-turbine and pumps. This open type of heater was selected on account of the fact that it does not cause back-pressure upon the turbine. The water gravitates from the heater to a Worthington pump, and thence to the boiler.

The water used for condensing the gas is drawn from one of the gasholder tanks; is circulated through the condensers; and discharges into another gasholder tank. The two tanks, which act as condensing ponds, are connected by a 6-inch pipe. This water is circulated by a Deane pump, 9 inches by 5½ inches by 10 inches, made by the Pulsometer Engineering Company, and is given out as being capable of delivering 3420 gallons of cold water per hour, at a piston speed of 60 feet per minute. A second pump, of the same size and construction, is arranged as a stand-by either to the condenser pump or to the boiler feed.

The pumps for circulating the effluent liquor which has been separated from the tar, &c., deposited from the washer, condensers, and scrubbers are of the horizontal duplex piston type, brass fitted throughout—size, 5¼ inches by 4¾ inches by 5 inches; capacity, 125 gallons per minute. They were manufactured by the Snow Steam-Pump Company. The same type of pump, but smaller, is used for drawing the oil from the storage tank and delivering it through the meters and injectors to the superheaters, at a pressure of 30 lbs. to 35 lbs. per square inch.

Blowers and Turbines.—The blowers provide an air-blast to the generators, superheaters, and fixing-chambers. They are of the Sturtevant type, No. 8, with 18-inch outlet connections, and capable of delivering 13,000 cubic feet of air per minute, at 12 oz. pressure, when running at 1800 revolutions per minute. Each is directly coupled to an 18-inch Kerr steam-turbine of a six-stage type, manufactured by the Kerr Steam-Turbine Company, of Wellsville, New York.

The Kerr steam-turbines are of the multi-stage, bucket and nozzle, impulse type, each stage consisting of a set of nozzles and a bucket wheel, with double cup-buckets set in its periphery. The whole is enclosed in a sectional casing of cast iron.

When steam of high-pressure is expanded in a properly constructed nozzle to atmospheric pressure, or into a vacuum, its velocity is said to reach 3000 to 4000 feet per second.

In order to properly utilize the energy of high-pressure steam, it is necessary, in a steam-turbine of this type, to make a number of drops in pressure from stage to stage—each of such amount as will produce a steam velocity in each stage proportionate to the peripheral velocity of the bucket wheel against which it works. This is claimed to have been accomplished in the design of the Kerr turbine by a correct proportioning of the steam-nozzle areas of the different stages.

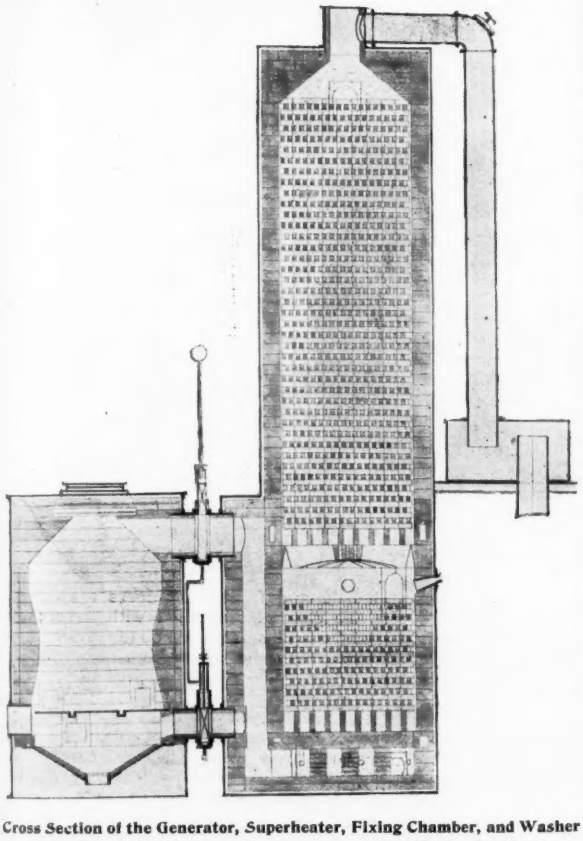
In the design of the turbine, simplicity and reliability have evidently been kept in view; and, as there is only continuous rotary motion to deal with, the result has been a machine of extreme simplicity, and, judged from turbines which have been in operation for a considerable time, also one of great reliability. There are two points only at which the shaft is in actual rubbing-contact with the stationary parts of the turbine, and these are the bearings.

The shell or cylinder of the turbine is made up of two end castings, between which are diaphragm castings, which contain the nozzles, and divide the cylinder of the turbine into separate stages. The diaphragms are accurately centred with each other, and with the two end castings, by turned or bored tongue, and groove-joints. Outside the groove, the diaphragms are in contact on an accurately faced metal-to-metal joint. The groove is packed with fibrous packing. The end castings carry the weight of the turbine, and are provided with accurately faced supports which are bolted to the bed-plate.

The spindle or rotor is made up of a steel shaft, upon which are mounted the bucket wheels, the number of which depends upon their own diameter, the range of steam pressure under which the turbine is to operate, and the number of revolutions per minute of the driven machine. The bucket wheels are machined from flange steel, and are slotted to receive the buckets, which are secured in place by dovetail slots, into which the shanks of the buckets are inserted and riveted.

The weight of the rotating element of the turbine is comparatively light. This makes it practicable to use a small diameter shaft both in the bearings and in the glands where the shaft passes through the turbine casing, and permits the design of a bearing which is at all times safe from overheating. The actual surface speed of the shaft in the bearing is not great, notwithstanding the high rotative speed of the shaft; and it reduces to a minimum any possible difficulties that might arise from a high surface-speed at the glands.

The governor, which is of the centrifugal type, is mounted on the end of the shaft, and rotates with it.



Cross Section of the Generator, Superheater, Fixing Chamber, and Washer of the Merrifield-Westcott-Pearson Carburetted Water-Gas Plant.

The Kerr turbines appear admirably suited to this class of work. They are simple in construction, smooth running, and self governing; they run at a comparatively slow speed, and, being directly coupled, are without objectionable gearing; and in actual practice it is found that, when running at 1800 to 1900 revolutions per minute, they give a pressure of 20 to 23 inches head of water when no blast valves are open, and maintain a pressure of about 17 inches when the air blast to the generator and superheater are open to their usual capacity.

Coke-Elevator.—A Tangye ram-pump is employed to operate a hydraulic hoist for raising coke to a large overhead hopper constructed over the engine-room, and adjacent to the operating floor. A hopper waggon is placed on the cage of the hoist at such a level as will enable it to receive a cart-load of about 13 cwt. of coke. This is elevated to a height of 36 feet, at which level it is run on to a line of rails, and by opening a sliding door its contents are deposited where required in the coke-storage hopper. Three shoots lead from this hopper to the operating floor of the generator-house at such a level as to allow of all the coke dropping into the charging buggies for the generators. These shoots have just been fitted with a screening arrangement which thoroughly removes all dust and breeze—allowing the large coke to fall into the charging buggy and bye-passing the breeze to the ground floor, whence it is removed to the boiler to be used as fuel.

Generating Plant.—The generator-house is a two-storey building. The ground floor is 16 feet high; the upper or operating floor is 20 ft. 6 in. high to the eaves. Upon the operating floor all valves, gauges, meters, and levers are assembled; so that the operator has everything at his hand and under observation.

The generators are steel cylinders, 8 ft. 6 in. in diameter by about 16 feet high, formed of ⅜-inch steel plates, and lined with 12 inches of fire-bricks in two thicknesses, with about 3 inches of silicate cotton wool packing between the fire-bricks and the cylinder. The fire-bars are of 2-inch by 2-inch steel, at the level of which are five cleaning doors to facilitate clinkering operations. Below the fire-bars there is a hopper-shaped portion for collecting the ash and small clinker which pass through the bars, and from which the gas off-take for the down-runs is placed, as well as the steam inlet for the up-runs and the blast connection. The hopper bottom is fitted with a self-sealing door, operated by a lever, which can be locked into position. The top of the generator is also fitted with a self-sealing door 2 feet diameter, with a sight cock in it. There are two gas off-takes—one near the top of the generator and the other leading off the hopper near the bottom just referred to. Each is fitted with a valve—either dry or wet, as may be selected. The upper off-take valve is used when making an up-run—*i.e.*, when passing the steam in an upward direction through the fire; the lower off-take is used for down-runs, of which there is, on a average, about one for every four up-runs. The steam connection for the down-runs is situated near the top of the generator.

Unlike another type of plant which has very largely been installed in this country, the one under consideration has the fixing-chamber placed over the superheater, forming one piece, where the other type referred to has two separate pieces of apparatus to accomplish the same end. Both makers, of course, claim their own design to be the best.

The superheater follows the generator, and is about 15 feet high, while on plan it is in the form of an elongated cylinder, 10 feet by 8 feet, with semi-circular ends. This allows of the superheater being 5 ft. 10 in. in diameter inside, while the remaining space is occupied by a fire-brick-lined vertical duct, down through which the products from the generator reach the superheater. The fixing-chamber is a continuation of the superheater, and stands 21 feet high, and is also 5 ft. 10 in. inside diameter. Like the generator, the superheater and fixing-chamber are lined with fire-bricks to a thickness of about 10 inches, and having about 3 inches of silicate cotton packing between the fire-brick lining and the outer steel shells. Within these chambers a mass of chequer fire-brick is so arranged as to form a perfect baffle, and to present a large heating surface to the flow of the gas. Two air-blasts are introduced—one near the bottom of the superheater, the other near the bottom of the fixing-chamber. Each air supply is controlled by a valve, and enters an annular chamber, from which there are numerous outlets around the circumference of the vessels so arranged as to give an equal distribution of air over the entire area.

A T-piece is fixed on top of the fixing-chamber, the vertical branch of which carries the stack-valve, which opens to the atmosphere; the side branch leading the gases to a 14-inch down-take pipe. This pipe is sealed in the washer, which is nothing more than a seal-box 6 feet in diameter by 3 feet high. The seal prevents the back-rush of gas from the gasholder when the stack-valve is opened to the atmosphere. As a further precaution, a pivoted valve is fitted to the seal-pipe, which closes simultaneously with the opening of the stack-valve by the pulling of one lever. An overflow from the washer is led to a seal-pot. The gas passes from the washer in a downward direction through a pipe which stands a few inches above the water in the washer, and is conducted to the inlet of the condenser. Use is made of the hot gas passing down this pipe to heat the oil before entering the superheater, by having a coil of steel tube placed inside the gas down-take pipe. The oil enters at the bottom of the coil and leaves at the top.

Course of Oil.—It may be interesting at this stage to consider the course of the oil from the storage tank until it becomes a fixed gas. The oil gravitates or is drawn from the oil-storage tank to the pumps; is then forced through a Worthington meter situated on the operating floor through the regulation valve; then to the heating coil referred to; and thence to the injectors or sprayers, of which there are three arranged around and near the top of the superheater, and all upon the same level. The ends of the injectors are in the form of a union-jet burner—*i.e.*, the two small jets are so arranged that when the oil passes through them, it spreads out in a flat sheet of fine spray or invisible mist, right across the superheater at right angles to the flow of gas. The small orifices in the injectors can be effectually cleared when required by fine wires operated by a lever arrangement which is easily accessible; and this, although seldom necessary, should occasionally be attended to.

By introducing the oil at the position mentioned—namely, near the top of the superheater—it is thoroughly vaporized by the heat of the water gas as it passes through the duct and superheater; and having a considerable mass of heated brickwork between the generator and the points of injection, it is not affected by the changes of temperature which must necessarily occur on account of the condition of the fuel bed in the generator, which is

at times perfectly black, and at other times may be approaching a white heat.

Scrubbers and Condensers.—In the plant under review, there are two scrubbers and two condensers, and they are so arranged that either set of one condenser and one scrubber may be used independently, or the gas may be made to pass through the four vessels. This arrangement has been found to be very satisfactory; and the fact of being able to operate the two sets independently will be a great convenience should any fault develop in one or other of the single sets.

The scrubbers are vertical, and are constructed of steel shells, 22 feet high by 6 feet in diameter, filled with wooden grids, forming a baffled course for the gas. The effluent liquor pumped from the tar and liquor separating tank is introduced at the top of the chamber, and is deposited at some pressure on to sprinklers, which distribute the water over the entire area. The water is run off to a seal-pot, and thence back to the separating tank.

In external appearance the condensers resemble the scrubbers. Each is divided into two compartments, so that the gas coming in at the bottom passes up through one series of tubes to the top, and over and down through another series of tubes to the bottom. Each condenser has a total cooling surface of about 3128 square feet. The condenser water circulates around the tubes—entering near the bottom and being led out at the top. The condensed products are drained into seal-pots. The outlets from all the seal-pots are connected to a 6-inch pipe, which conveys the tar and liquor to the separating tank.

Tar and Liquor Separator.—The separator tank for the tar and liquor is one of the most perfect the writer has seen. It is constructed of concrete and divided into three compartments, containing the separator, the tar, and the liquor respectively. The separator consists of a rectangular box, 22 feet long by 3 feet wide and 9 feet deep. It is placed underground, at such a level as to allow the tar and liquor to gravitate from the seal-boxes of the condensers, scrubbers, and washers to the top of the separator, and is divided into seven separating compartments by means of diaphragm plates, which extend to within 4½ inches of the bottom of the box. Each diaphragm plate, except the last one, reaches to within 13 inches of the top; and alongside each plate there is a skimming plate extending from the top to about 8 inches below the top of the diaphragm plates.

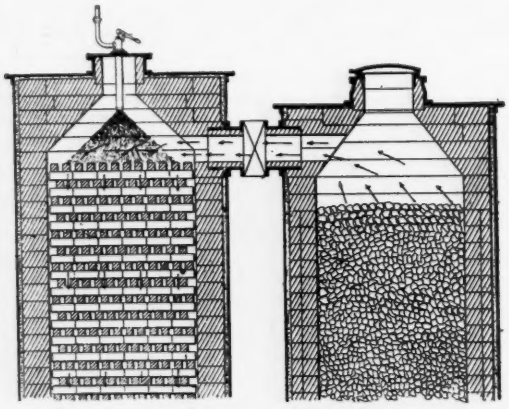
The tar, being slightly heavier than water, sinks to the bottom, and what tar may pass over the skimming plates in the first chamber is taken up by one or other of the succeeding chambers. The tar-chamber is placed at the opposite end of the box from where the mixed liquors enter; and the tar is syphoned into a storage tank, from which it is pumped to an overhead tank. It is then run into tank-waggons and conveyed to the chemical works, or it may be worked up along with the coal tar as desired.

The water or effluent liquor is run into one of the compartments of the concrete tank, and passes over a series of brick partitions. Before overflowing to the drain, it is again twice skimmed. Near the outlet is the suction pipe and foot-valve for the effluent liquor pumps, which re-circulates it to the washers and scrubbers.

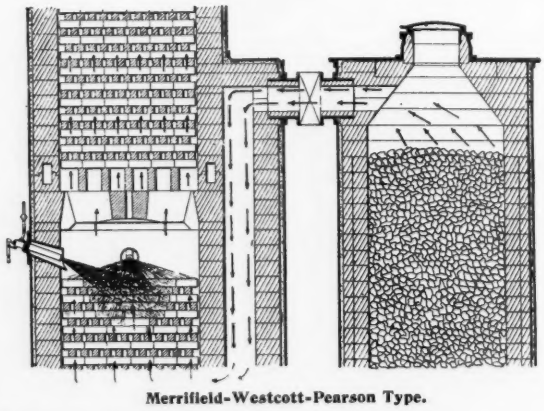
Our experience with Scotch shale oil, over six months' working, showed that the quantity of tar sold represented 19½ per cent. of the oil used.

Tar-Extractor.—One of Colman's "Cyclone" tar-extractors is placed on the inlet of the relief holder. The machine is constructed of No. 10 gauge steel, riveted together. The upper part is cylindrical, while the lower part is conical. The inlet for the contaminated gas supply enters the side of the upper part at a tangent; and the outlet is taken off the crown. The lower or conical part terminates in the tar outlet, which is led in a 3-inch pipe, and sealed in the separating tank.

The principle of its action is said to be as follows: The gas is blown into the separator through the tangential gas inlet, and assumes a whirling motion, forming a vortex, by which the tarry particles are driven by centrifugal energy to the outside of the whirling gas, and pass down the inner surface of the conical chamber, at the bottom of which they are discharged. The helical stream of whirling gas descends towards the bottom of the cone, and, practically free from tar, turns inwards and upwards in a spiral column through the gas outlet at the top or crown of the machine.



Ordinary Double Superheater Type.



Merrifield-Westcott-Pearson Type.

Diagrams showing Comparison of Two Oil-Injecting Systems.

While not in a position to state the quantity of tar and liquid deposited by this extractor, the writer is satisfied that good work is being done; and he has never observed the slightest appearance of tar on the grids of the purifiers.

Relief Holder, Purifiers, and Meter.—In working a carburetted water-gas plant, a relief holder is necessary to take up the intermittent makes and to supply a constant flow of gas to the exhauster and purifiers. But the holder need not be a very large one, although in Aberdeen one of the existing gasholders, of about 580,000 cubic feet capacity, is used. Large storage capacity is certainly a convenience, because, if only two eight-hour shifts are being worked, the exhauster may be run continually throughout the twenty-four hours at a slow uniform rate per hour.

In the case of the plant at Aberdeen, no additional capital was expended upon gasholder, exhauster, or purifiers.

A slight rearrangement of piping and the introduction of a few valves allows of this portion of the plant being made suitable for either coal gas or carburetted water gas.

At the outlet of the purifiers, a rotary meter, of a capacity of 40,000 cubic feet per hour, is installed. The carburetted water gas, on being measured here, unites with the coal gas, and together pass through the station meters, and thence to the gasholders.

Operating the Plant.—To start-up the plant a fire is kindled upon the grate-bars, and coke is added from time to time until the generator is about two-thirds full. During this operation, natural draught only is required; the front fire-door and stoke-holes, also the generator lid, being open for a start.

When there is sufficient depth of fuel in the generator, and all is well alight, the stokehole and front firing-doors are closed; the hopper bottom of the generator is filled with water; the charging lid is closed; and the blast is turned on to the generator—the stack valve being open to the atmosphere all the while. After blowing for about ten minutes, a little steam is admitted to the underside of the generator to keep the clinker disintegrated and to prevent injury to the fire-bars.

When the coke in the generator has been brought up to a dark cherry red, which may be observed by the sight-cock fixed on the charging lid, the gas can be ignited in the superheater by opening the blast-valve to same. As soon as ignition has taken place (as can be observed at the sight cock fixed on the superheater), a little more superheater blast may be applied to expedite the heating of the fixing-chamber.

As soon as the superheater gets red, its blast may be reduced a little, and the fixing-chamber blast opened to ignite the gas there. When ignited, more blast may be added to bring up the temperature to the required pitch.

At this stage it will be necessary to replenish the fuel-bed. The air-blast is shut off from the fixing-chamber; then from the superheater; and lastly, from the generator. The steam is then shut off, and the generator charging lid is "struck" and opened up.

The generator should now be filled up with coke to within about a foot of the gas off-take, and the fuel levelled-up and then spread to the sides, forming a saucer-like surface. The charging lid is then closed, and the heats are raised as before. When the generator fire is in a proper condition, and the heat in the superheater shows a cherry red and straw colour in the fixing-chamber, all is ready for making a run of gas. After making a couple of preliminary trials, the water is run off the hopper bottom of the generator, and the clinker and ashes are removed. After everything is in perfect working order, the normal procedure for making a "run" and "blow" is as follows: Shut down blast-valves to fixing-chamber, superheater, and generator; turn on steam to generator; shut stack-valve; then turn on oil. The oil must be so regulated that the quantity (3 to 4 gallons, according to quality

of gas desired) shall be delivered in 5 to 5½ minutes; leaving about one-and-a-half minutes' gasmaking to continue after the oil is shut off. Thus the water gas from the generator will take up any residue of oil gas which may be in the superheater and carry it forward to the relief holder. As soon as the oil is shut off the injectors, a little steam is permitted to pass through them to keep the nozzles clean and cool.

At the end of seven minutes (which is termed the "run"), the steam is shut off and the stack-valve opened; the blast to the generator and the superheater are opened; and, only if required, a little blast is admitted to the fixing-chamber. This is to recover the heats, and, in normal working, occupies four minutes.

The cycle of operations goes on regularly at four minutes' blow and seven minutes' run; and the routine work is so simple in practice that a labourer of ordinary intelligence can become an efficient operator in two or three days.

As already mentioned, there are generally about four up-runs and then one down-run. If steam were always admitted at the bottom of the generator, the fuel-bed would become chilled and inactive and saturated with moisture through the condensation of the steam. The result of this would be a poor yield of gas and an excess of carbonic acid in the finished gas. By closing the top gas off-take occasionally and reversing the process—admitting the steam over the fuel bed and causing the hot gas to pass down and escape at the bottom gas off-take—the base of the fuel bed is recuperated to some extent, and the work is more equally distributed throughout the entire fuel bed.

The closing of the top gas off-take valve automatically opens the bottom off-take, and *vice versâ*. There is thus no possibility of making any mistake, and the steam-valve for the up and down runs are situated close together upon one standard, and within easy reach of the operator.

The generator has to be supplied with a buggy of fuel at intervals of about 40 to 50 minutes, as required, and cleaned once each shift. To facilitate the operation of clinkering, spear-bars are introduced at all four stokeholes to carry the fuel bed, while the ash and clinker are removed from the bars.

Men Employed in Operating.—To operate one section of the plant described—*i.e.*, to make 750,000 cubic feet per twenty-four hours—three shifts are worked; and on each shift one boilerman (who also attends to the pumps and other machinery in the engine-room), one operator, and an assistant are employed—*i.e.*, three men per 250,000 cubic feet or thereabouts. Assistance is given in elevating the coke, which, for twenty-four hours' requirements, only occupies a few hours of two men, and assistance is also given in wheeling out the ash and clinker from the generator.

The clinkering of the generator takes place once per shift, and the off-going shift remains to assist the on-coming shift in the operation, which occupies from 60 to 80 minutes.

Purification.

Practically the only impurities to be removed from carburetted water gas are the sulphuretted hydrogen and the carbonic acid. The proportion of the former depends upon the amount of sulphur contained in the coke and oil employed, and is only about one-fifth of that contained in coal gas, while the carbonic acid to be removed is about 3 per cent. by volume. In Aberdeen, the purification of the carburetted water gas is conducted separately from the coal gas—a small set of four purifiers being used for the purpose (three on and one off). In each box, there are two layers of material containing about 6 inches of "Lux" purifying material, mixed with coke-breeze in the proportion of one to two, and an upper layer of English lime, 5 inches thick. Repeated tests have demonstrated that the presence of carbonic acid is practically *nil*, when sulphuretted hydrogen is evident by the acetate of lead test. This, as it happens, is very convenient, as the shift foreman, whose duty it is to test the purifiers, has a ready means of knowing when to change a purifier. The cost of purification (labour and material) has been 1·1d. per 1000 cubic feet; but it is expected that this figure will be reduced during the coming winter.

Composition of Gases.

According to Professor Alex. Crum Brown, the percentage composition of coal gas and carburetted water gas, each of about 25-candle power, is, in round numbers, as follows:—

	Ordinary Coal Gas. Per Cent. by Volume.	Carburetted Water Gas. Per Cent. by Volume.
Heavy hydrocarbons	9	13
Carbonic oxide	11	32
Methane	35	21
Hydrogen	40	25
Nitrogen	5	6

Oil Supply and Storage.

The oil used at Aberdeen is distilled from Scotch shale chiefly found in the counties of West and Mid Lothian. Gas oil is the third fraction of the crude oil; the first being naphtha, which distils at a temperature of 130° to 360° Fahr., and has a specific gravity of ·675 to ·775. The second fraction is burning oil, which distils at a temperature of 284° to 560° Fahr., specific gravity of ·765 to ·830. Gas oil has a specific gravity of ·840 to ·870; and regular fractionation may be relied upon within the limits of 484° and 755° Fahr. It has a flash-point of from 200° to 220° Fahr., which is well over the minimum demanded by the Petroleum Act, 1879, which is 73° Fahr. The oil is a bye-product, and is chiefly used for enriching carburetted water gas and the manufacture of oil gas by Pintsch's process. Delivery is given in tank-waggons, containing from 8 to 13 tons. The waggons are run into a siding, and placed over a receiving-box fitted with a fine wire gauze, which arrests all sediment. On opening the cock which is fixed under the waggon, the contents pass over the gauze screen into the receiving box; thence by gravitation to a tank placed underground. A 2½ B.H.P. gas-engine drives a centrifugal pump which delivers the oil into the storage tank.

The storage tank is 35 feet in diameter by 18 feet high, and rests upon a concrete foundation 37 feet in diameter by 12 inches thick. It is constructed of steel plates, and is roofed with light sheeting on trussed framing, similar to a gasholder crown. The oil-inlet pipe reaches to the top; while the outlet is placed at a level 4 inches above the bottom. This allows of about 3½ inches of water being stored in the bottom, which is less liable to leak than oil; and if leakage does take place, water is lost and not oil. Two test-cocks are fixed on the side of the tank, to indicate the water and oil levels respectively. The tank is capable of storing upwards of 400 tons of oil, or 104,000 gallons.

The equivalent of one ton of oil to one ton of coal (for comparison of storage) is interesting, and may be found thus—

1 ton of water = 2240 lbs.
1 gallon do. = 10 lbs. ∴ 1 ton water = 224 gallons.

The specific gravity of oil may be taken to average ·860.

$$\therefore \text{ 1 ton of oil} = \frac{224 \times 1000}{860} = 260 \text{ gallons.}$$

For every 1000 cubic feet of gas made, of (say) 25-candle power, it may be reckoned that 3½ gallons of oil are required; and as one ton of oil contains 260 gallons—

$$\text{1 ton of oil} = \frac{260 \times 1000}{3\frac{1}{2}} = 74{,}285 \text{ cubic feet.}$$

Taking one ton of coal as equivalent to 10,000 cubic feet, one ton of oil will be equivalent to $\frac{74{,}285}{10{,}000} = 7{\cdot}42$ tons.

It will be seen that 400 tons of oil are equivalent to 2968 tons of coal of 25-candle power, and occupy an area only 35 feet in diameter, which is a consideration of no small importance, especially when the country is threatened with a "coal crisis."

Oil Equivalent in Coal.

In making up comparisons for coal contracting, the writer's practice has been to work out the oil equivalent in tons of first-class cannel coal as follows:—

1 ton of oil = 260 gallons, and 4 gallons = 1000 cubic feet.

$$\text{1 ton of oil} = \frac{260}{4} \times 1000 = 65{,}000 \text{ cubic feet (of which}$$

about 22,000 cubic feet are pure oil gas).
and 1000 tons of oil = 65,000,000 cubic feet, or equivalent to (say) 6000 tons of rich cannel coal.

1000 tons of oil	at 55s. per ton	= £2750
1450 ,, coke	at 12s. ,,	= 870
	Water (say)	= 20
		£3640

The raw materials required to convert 1000 tons of oil into gas cost £3640; but as this is equivalent to 6000 tons of rich cannel, the equivalent of the oil in tons of cannel coal = £3640 ÷ 6000 = 12s. 2d. per ton. But in working carburetted water gas, residuals are lost to the extent of (say) 6s. 2d. per ton, which brings up the cost per ton to 18s. 4d. On the other hand, there is less labour and purification required, equal to 1s. 3d. per ton, which falls to be deducted. So that one ton of oil is reckoned equal to six tons of cannel coal of 28-candle power, costing 17s. 1d. per ton.

The present contract price of rich cannel is 28s. 2d. per ton delivered into stores at the Aberdeen Gas-Works. Needless to say, the order for cannel has been considerably reduced, while the order for gas oil has been correspondingly increased.

In passing, it may be noted that the current price of ordinary splint coals is from 14s. to 15s. 6d. per ton delivered into the gas-works at Aberdeen.

Working Results at Aberdeen.

On p. 320 are given the working results obtained upon the carburetted water-gas plant at Aberdeen over a period of three months last winter, during which time 50,711,000 cubic feet of carburetted water gas were manufactured, and which is only about 73 per cent. of what one set of apparatus is capable of producing.

It will be seen that the oil is the important factor in the matter of cost. An advance of 1d. per gallon represents about 3½d. per 1000 cubic feet, and is equivalent to an advance of 3s. per ton of coal. It was with feelings of gratification, therefore, that the writer was able to fix the current year's contract for oil at £2 15s. per ton delivered at Aberdeen, which is equivalent to 2·53d. per gallon—a drop of 17s. 6d. per ton, or 0·82d. per gallon on last year's prices.

The carburetted water gas for the current year will, therefore, work out at about 2¾d. per 1000 cubic feet less than it cost last winter, or about 13·35d. into the gasholder. The reduction in the price was all the more welcome from the fact that rich cannels have been advanced 4s. per ton on last year's prices.

The geographical position of Aberdeen—with its seaport, and regular traffic with the Continent, together with the Free Trade policy still obtaining—is doubtless responsible for the favourable terms upon which oil has been offered by the home producers.

As the production of carburetted water gas is dependent upon coal gas, it cannot be considered otherwise than as an accompaniment and auxiliary to that process; and besides being a

Average Price per 1000 Cubic Feet of Carburetted Water Gas of an Average Illuminating Power of 25 Candles, over a Period of Three Months (Intermittent Working).

Oil, 3·44 gallons at 3·35d. per gallon (£3 12s. 6d. per ton)	11·52d.
Coke for generator, 42·8 lbs. at 12s. per ton	2·75
Coke and breeze for boiler, 17·3 lbs. at 7s. per ton	0·64
Wages for manufacture (including all casual labour required)	0·97
Wages for purification	0·23
Lime for purification, 8·96 lbs. at 18s. 3d. per ton	0·87
Water for steam-raising, &c., 10·5 gallons	0·05
	17·03d.
Less for residual tar	0·93
Net price into gasholder	16·10d.
Gas made per hour over the daily gas-making of twenty hours averaged	38,000 cubic feet.
Gas made per ton of coke used in generators	52,336 ,,
Candles per gallon of oil per 1000 cubic feet	7·46
Specific gravity of the gas	0·659
Heating value of the gas	670 B.Th.U. Gross.
	or 616 ,, Net.
Carbonic acid in crude gas	2½ to 3½ per cent.
Tar sold—percentage of oil used	19½
Selling price of tar at gas-works	1¼d. per gallon.

The coal gas for the same period (coal costing 16s. per ton or 18·61d. per 1000 cubic feet), less residuals, worked out at 15·14d. per 1000 cubic feet for gas of 20½-candle power; while the mixed gases for the same period were 15·31d. per 1000 feet for gas of 22½ candle-power.

convenient enricher, it has claims to adoption in other respects. Its merits as an emergency plant are worth consideration. It is possible from dead-inactivity to have the plant brought into full use in five hours, and dropped in as many minutes without injury to the plant; while the cost for hanging the plant ready for use is very little. It will be conceded also that it is almost independent of labour; for inexperienced men, under competent personal supervision, could assume control of a plant in an emergency.

With a normal coke stock, it affords partial independence of coal supplies; while its absorption of coke stocks tends to maintain prices of that product, and saves labour in handling it.

The plant erected at Aberdeen is most complete and up-to-date, has fulfilled the writer's highest expectations, and is a credit to the Contractors, who carried out the work expeditiously and thoroughly. The first season's working results speak for themselves; but that short experience has suggested certain improvements in working which will be given effect to next winter. It might also be mentioned that working results for short periods could be produced which would show superior results to that given. But such rosy statements, while useful as a contractor's advertisement, are rather misleading; and the writer ventures to hope that the results of three months' working will be more acceptable to the members of the Association.

Discussion.

Mr. A. Yuill (Dundee) congratulated the author on his paper. He hoped that since Mr. Milne had now ventured to come into the arena, they would have more of his productions in the future. Mr. Milne had given them particulars regarding the construction of the plant, together with the results he had obtained. On these two points they could not offer criticism. Anyone who had had similar plant at work might compare notes with him, mainly as to costs. There were not many carburetted water-gas plants in Scotland. He thought they were only to be found in Aberdeen, Dundee, and Edinburgh. The results Mr. Milne had obtained coincided very much with his own experience. The plant Mr. Milne had differed somewhat in construction from the one he (Mr. Yuill) had, which was Humphreys and Glasgow's system; but in the working results they arrived pretty much at the same figures. In his own experience, he found the plant most beneficial in the past; and he thought he might look forward to greater benefit, more particularly when they had a coal crisis before them. In the present situation, they could understand the benefit it conferred upon them, because, in his own case, he would be able to lessen the coal consumption per day to the extent of 75 tons. This meant a good deal when coal supplies were scarce, and they had not a good stock on hand. He hoped that the difficulty which they were all interested in, more or less, might pass away, and that those who were trying to bring about a better state of feeling between masters and men would be able to do so. Mr. Milne, in describing his plant, spoke of 12 oz. pressure. He worked this out, and found that his pressure was 21 oz., which practically meant 21 oz. on the water gauge. He found it most advantageous to work at this pressure. He ran the blower at 2000 revolutions per minute, as against 1800 revolutions in Aberdeen. With reference to the number of men employed, being the same size of plant it naturally followed that the same number were engaged; and he found that the men required to work practically the same as in Mr. Milne's experience. In the purification, the only thing which troubled them was, naturally, the carbonic acid; and it depended to some extent on the temperature, or the heat in the superheater. He generally found in working about 2 per cent. of carbonic acid. He could use both the purifiers and the gasholders for coal gas.

Mr. D. Robertson (Dunoon) said there were some figures he would like Mr. Milne to explain to them. The author said that the proportion of impurities in carburetted water gas was just about one-fifth of those in coal gas, and he told them that the cost of purifying material was 1s. 1d. per 1000 cubic feet. These figures seemed somewhat contradictory, because if the cost were 1s. 1d. per 1000 cubic feet, then the cost of purifying coal gas must be five times as much. He could not understand this part of the paper.

Mr. G. R. Hislop (Paisley) remarked that he was not in a position to speak from experience of the working of carburetted water-gas plant. Although he had had it in contemplation for some time, he had not yet introduced it; but he might have it. He noticed the matter of purification, as being about twice the amount he generally set down as the cost of the purification of coal gas. Possibly there might be some little mistake. However, he recognized in this process a very valuable adjunct to any gas-works. It had the advantage that they could begin making gas within five hours of starting the plant; and as a stand-by, there was nothing to compare with it. In large works, in particular, he thought it had become a *sine quâ non*. He agreed with all the advantages Mr. Milne had enumerated. They could enrich the gas to any extent. He remembered some years ago, when he was considering the adoption of water-gas plant, he had Mr. Humphreys at his place, and discussed the matter with him. It was proposed to supply gas of 27-candle power. His difficulty was how to obtain this. Mr. Humphreys assured him that he could quite well make 27 or 28 candle gas. He was still sceptical as to his being able to make the gas permanent. However, he had learned since that it was quite a practical operation. According to modern systems of manufacture, there were very few towns in which gas of over 20 candles was supplied; and therefore they were come to an epoch in their work which would enable them to supply gas of this kind, and with great advantage. They were behind their English neighbours in taking up any processes of this sort; but he thought that, in Scotland, where they were lowering the standard of their gas, the time had come when they could with advantage adopt such a system as this.

Mr. Alex. Wilson (Glasgow) said that they tried carburetted water-gas plant some years ago, and compared it with their coal-gas manufacture; and they found that the water gas was costly, as compared with what they could make coal gas for. They discarded the water-gas plant. The holder room in Glasgow was so ample that they did not feel the necessity for having it as a stand-by. But the time might come when they might find it advisable—although even now he did not think it advisable—to put down plant and make carburetted water gas, though it might be at a greater cost than they could manufacture coal gas.

Mr. W. J. Smith (Carlisle) asked Mr. Milne to state the class of oil he used, and also the method of determining the illuminating power of the gas. It was somewhat of a mistake to think that carburetted water-gas plant was a very good stand-by, because, with inverted burners they had to deal with, and the necessity for a constant specific gravity, the variations of water gas made it not suitable.

Mr. Milne, in replying on the discussion, considered the remarks made by Mr. Yuill had been corroborated by what he had already said. He did not think there was anything which called for reply. In regard to Mr. Robertson's question as to the cost of purification, he must admit that, on the face of it, it would appear that there was something wrong. Nevertheless, it was a fact that there was only about one-fifth of the sulphur in the carburetted water gas that there was in coal gas. If they were to leave the carbonic acid in the gas, they could use oxide alone, and reduce the cost of purification to considerably under the cost for coal gas; but they had to remove the carbonic acid, or add a further proportion of oil to compensate for the loss of illuminating power which they would have if there were over 5 per cent. of carbonic acid. It was the removal of the carbonic acid which raised the cost of purification. It might be, also, that their system of purifiers was somewhat against the purifying of the gas economically. He believed it would have been better to have had two sets of purifiers—one for the removal of the sulphuretted hydrogen, and a separate set of boxes for the removal of the carbonic acid. However, he expected to be able to reduce the purification costs; and if they could get it down to about ¾d. per 1000 cubic feet, he would be quite satisfied. But he believed he would have a better system of purification if he had a separate series of boxes. He thanked Mr. Hislop for his remarks on the paper. It was now an accepted fact that carburetted water gas of 28, or even 30, candle power could be made perfectly permanent. Mr. Smith wanted to know how the gas was tested. He had a photometer for the testing of the carburetted water gas. He led a pipe specially from the gasholder to this particular photometer; and the gas was tested by the "Metropolitan" No. 2 burner. They would get nothing like the same efficiency if they tested with a flat-flame burner. Possibly the No. 2 burner was more nicely adjusted. While the statement of 7·46 candles per gallon of oil per 1000 cubic feet might appear to be high, he could confidently assure them that he had got higher results than this with the plant; but this was the average. While it would pay them to use carburetted water-gas plant at Aberdeen, he admitted that it might not pay some of the members who were situated at the pit mouth. They must bear in mind the long railway carriage they had. Probably they were paying 5s. or 6s. per ton more than others, on account of carriage; and while it paid them in remote parts, he did not say it would pay everyone to introduce carburetted water-gas plant. While the results satisfied him, they must remember that he was in a different position, geographically, from most of the members.

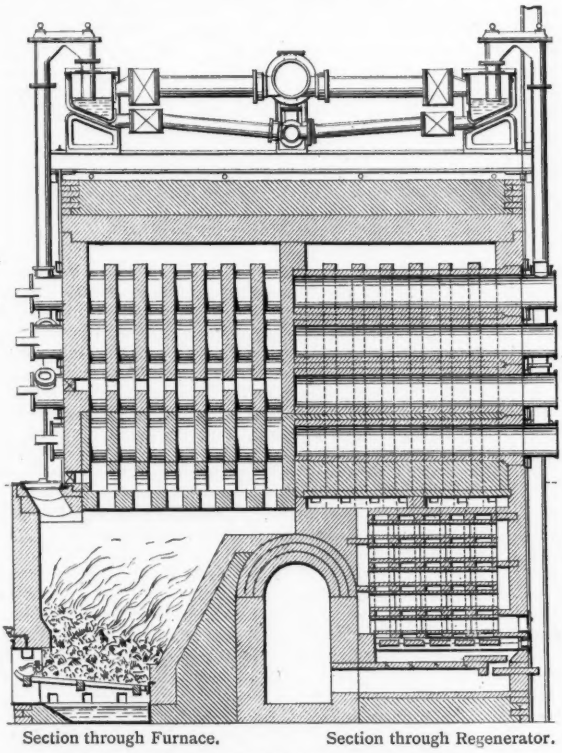
THE LATEST PRACTICE IN HORIZONTAL RETORT-SETTINGS.

By William Wilson, of Falkirk.

[A Paper read before the North British Association of Gas Managers.]

It may seem a little out of place to talk of horizontal retorts at the present time, when all the world is concerned with the perfecting of the various systems of vertical retorts; but I offer no apologies, as there may be not a few members of the North British Association who are similarly placed to myself—having charge of an over-capitalized concern, whose policy it is to "mark time" until some of the monetary burden is wiped off, and who meantime cannot face the scrapping of comparatively new plant representing thousands of pounds of capital value, and thereby burn their boats and plunge into the struggle for vertical retort supremacy. To members who may be suffering in the winter time from shortage of retort power, I would direct my description of how the difficulty was faced in Falkirk.

During the winter of 1907-08, all available retorts were at work; and as the demand for gas had shown annual increases for the previous three years of 10, 14, and 14 per cent., it was deemed too risky to try to weather another winter with the existing retorts, even supposing they were all in good order. The question, therefore, presented itself of how best to increase the retort-power or gas-producing power. The introduction of a water-gas plant was not considered, as we have a good market for coke and ample holder accommodation. To duplicate the existing retort-house, with coal-store and coal-handling plant and stoking-machinery, &c., would cost £18,500. This placed that project out of the count; and verticals were at that time more or less in the Patent Office. I, therefore, considered how best to increase the number of retorts without altering the existing retort-house and machinery. The only way, of course, was to alter the settings and add another tier of retorts.



Section through Furnace. Section through Regenerator.

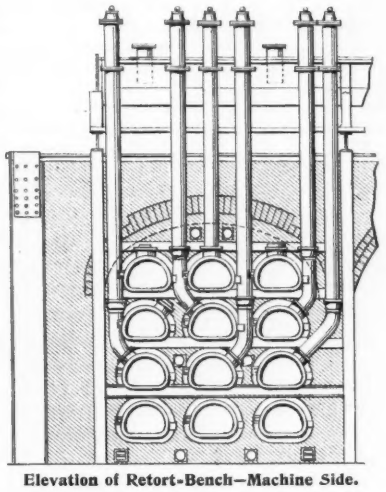
Retort-Bench at the Falkirk Corporation Gas-Works.

After fully considering the existing conditions of retort-bench settings, ironwork, and machinery, and after visiting Glasgow and Dundee to see settings of twelves in operation there, I decided in favour of adopting similar settings. The Falkirk settings differ somewhat from either of these, in that they have 20 feet through retorts heated by internal producers at one side only. The Dundee settings have stop-ended retorts, 10 feet long, with internal producers on each side; the Glasgow settings have stop-ended retorts with external "Jumbo" producers.

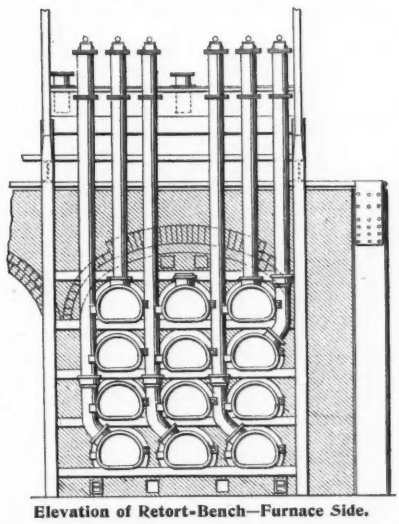
A description of the original settings may not be out of place here. They were of eight retorts, 20 feet through and 22 inches by 16 inches, having producers at one side only, and each retort having two ascension pipes—there being a hydraulic main on each side of the bench. There were twelve ovens; making a total of 96 retorts. The retorts are charged and discharged by Dempster's well-known machines, electrically driven, one projector charger, and one telescopic pusher or discharger.

The method of conversion was this: Seven old settings of eights had the mouthpieces, ascension-pipes, bridge-pipes, and retorts removed as far as the top of the regenerators, which on examination were found to be in good order after working three winters. It was therefore decided to allow them to remain. The pier-walls between the settings were then strutted to each other, and the arches removed. The pier-walls were then heightened, and new elliptical arches were formed. No alterations were required to the bench-binders or the hydraulic main, &c., as owing to a wise forethought on the part of the late Mr. William M'Crae, there was ample room to carry up the brickwork without disturbing them. The end bench-binders only had to be lengthened 18 inches, by a short length of rolled steel joist of the same section, which was secured by fish-plates and bolts. The arch oven, producer, and producer-gas flue were lowered a little, and the size of the producer was enlarged by making it project 27 inches. This projection allowed a much better feeding arrangement for the producers than formerly. Ten retorts out of twelve are now available for the furnaces, if necessary, instead of four out of eight. The advantages of a regular supply of fuel to the producers are well known.

The original combustion chamber was replaced by a retort, and two small combustion chambers were formed, as shown in the drawing. The combustion chambers are made entirely with Yorkshire Silica bricks and also the crown of the main producer gas-flue. The cross walls of the settings are formed of the same materials between the centre row of the retorts and the side rows half-way up. No trouble has been experienced through using this material, which has proved highly satisfactory. The bottom corners of the first two tiers of retorts next the combustion chambers are formed square outside, after the Dundee pattern. The retorts have now one ascension pipe only; the pipes being carried up on alternate sides, as shown. Having now a smaller number of ascension-pipes than formerly, we have, of course, left over four spare bridges from each oven and four idle dip-pipes. The dip-pipes were closed with a blind-flange, and the idle ascension pipe-faucets on the original mouthpieces were plugged with a cast-iron plug. Eight new mouthpieces were required on each oven, which were made, where possible, without any faucets. The bottom mouthpieces on the producer side (having no ascension-pipes) are made as short as possible. This enables the bottom centre retort to be discharged into the producer without any feeding device whatever.



Elevation of Retort-Bench—Machine Side.



Elevation of Retort-Bench—Furnace Side.

The machines were easily altered to suit the elevation of the

retorts. In the case of the charging machine, no alteration was made to the frame, as it was only necessary to remove a small coal-weighing hopper to allow the cage carrying the charger to travel 2 feet higher. In the case of the pusher, however, the frame had to be extended. The cost of the alteration to the machines was £235.

While talking of the machines, I might mention that opportunity was taken to effect one or two improvements while the machines were under alteration. The most important of these was on the pusher, where one motor either hoists or lowers or operates the pusher—these operations being effected at will by means of jaw-clutches. Friction clutches were substituted, and two wire ropes were introduced for operating the internal portion of the telescopic ram, in place of the previous single rope. These alterations have greatly increased the life of the wire ropes. The ropes for the internal ram now discharge coke from 3000 tons of coal without renewal. They cost 17s. 6d. each, while the ropes on the external ram have been in use for twelve months, and have handled coke from 22,000 tons of coal.

In the case of the charging-machine, the discarding of the small hopper for weighing the charges was at first thought to be a serious disadvantage; but we now find a marked improvement in the evenness of the charges without it, for whereas previously the weighed charge had to pass through the charger whether the retort was full or not, the operator has now a pedal-operated clutch-driven band-feeding arrangement whereby he can stop the feed at any time. He has also an arrangement of two mirrors, which enables him to see right into the retort while standing behind the charger. The weight of the charges is got by noting the numbers and weights of the waggons elevated daily and taking stock in the overhead hoppers.

To return to the settings of twelves. No trouble has been experienced in the heating of these ovens, except at first when they were rather dull half way through. This was overcome by adjusting the dampers on the first or top travel of the regenerator flue. The bottom centre retort, being situated in the centre of the heat zone, is inclined to over-heat; and to counteract this, it is charged more frequently. The ascension pipe from this retort is the only one which has given trouble by choking. At first the settings were worked with 5½ cwt. charges at four hours intervals; but now, in order to save labour, we work 8 cwt. charges at eight hours. The bottom centre retorts being charged every four hours when the stock of gas is low, by increasing the heats, the retorts work off 8 cwt. charges in six hours. The fuel consumption in the producers has been carefully recorded. It runs from 22 to 25 per cent. of the total coke produced, and compares with 25 to 33 per cent. for settings of eights with the same regenerators.

The regenerators on six ovens are the usual zig-zag flue type, having Dempster's patent corrugated tiles in the partition walls between the second air-flue and waste-gas flue. The draught required on these settings in the last travel of the waste-gas flue next the dampers is 3-10ths to 4½-10ths water gauge. On oven No. 7, where the original regenerators could not be re-utilized, they were replaced by Brooks's patent regenerators; and on this oven the draught required is from 2-10ths to 3-10ths.

There are two marked advantages in the use of these settings so far as the labour of the stokers is concerned. They have only half the number of ascension-pipes to attend to and fewer furnaces.

As I have already stated, the retort-house into the coal-store and machinery and the bench of 96 retorts cost £18,500, or £192 14s. per retort, or £96 7s. per mouthpiece. The cost of the above-described alterations, including brickwork and alteration to the machines, was £3044 10s. This was allocated as follows:—

Capital	£1169 10 0
Revenue	1875 0 0
	£3044 10 0

The reason for charging £1875 against revenue was that eight retorts in each of the seven ovens would have been renewed in any case; so that roughly two-thirds of the cost of the brickwork is charged against revenue. The remaining one-third, and the cost of the alterations to the machines, make up the £1169 10s. The increased number of retorts was 28; giving a capital expenditure per retort of £41 15s. 4d., or £20 17s. 8d. per mouthpiece.

There is one other matter I should like to touch upon before concluding, that is the question of overhead coal-storage. As originally arranged, we had at Falkirk two overhead storage hoppers for supplying the machines. These hoppers each held 10 tons. This limited storage necessitated two elevator men on twelve-hour shifts in the summer time and three men on eight-hour shifts in the winter time intermittently supplying the hoppers.

While carrying out the foregoing alterations to the settings of twelves, I recommended the erection of a continuous hopper extending the full length of the retort-bench, which, with the extended conveyor, cost £775. The total capacity of the overhead hoppers is now 120 tons. The interest and sinking fund on this capital expenditure, at 5 per cent., is £38 15s.; and the introduction of the new hopper enables us to dispense with the services of two elevator men throughout the year—effecting a saving in wages of £146. The elevating is done during the summer months now in the spare time of the locomotive driver and shunter, and there is one elevator man required in the winter time. Our coal-elevator will handle 25 tons per hour.

There are several other advantages resulting from the introduction of this hopper. First, there are no waggons or machinery moving during the night; therefore, less risk of accidents. Second, there is much longer time available for adjustments and repairs to the elevating plant than formerly.

I am not sure whether the introduction of overhead hoppers would result in such a marked saving in very large works; but they have proved themselves to be of very great advantage at Falkirk, and the question of their introduction into other medium-sized works may be well worth consideration by the members present.

Discussion.

Mr. A. Smith (Tradeston) said he had retort-settings of twelves, in the Tradeston works, and also eights, but, of course, with stop-ends; and consequently the method of working them was altogether different from that of Mr. Wilson. Their charges were four-hour, both with the eights and the twelves. As to the filling of the producers, was it only the centre retort that the producer was charged from? Mr. Wilson's was certainly a very novel arrangement.

Mr. G. R. Hislop (Paisley) had had no experience with so many retorts set in one oven; but if Mr. Wilson realized what he had put before them, he had accomplished a very important advance in the setting of retorts, so far as regarded economy of space. If he were able to maintain the heat, upon settings of twelve retorts, which they obtained with settings of eight, it would be a very important advance in economy of both fuel and space. It would certainly be of very great advantage where space was valuable. If Mr. Wilson could sustain, in practice, the statements he had made in regard to the settings, he had no doubt that many would consider the propriety of increasing the capacity of their works in this way. He had no doubt that, in time, they might attempt it at Paisley, because they had not much land to spare, and he contemplated getting relief by the introduction of carburetted water gas. He congratulated Mr. Wilson upon his inventive genius. He had done exceedingly well in the matter of ascension-pipes, in taking one half off the one side and the other half off the other side. He wished that Mr. Wilson would have success in what he had attempted, and hoped to hear more about the subject in the future.

Mr. S. Milne (Aberdeen) wished to ask Mr. Wilson one or two questions. In the first place, had he a coke-conveyor? He thought he remarked that, in discharging the coke, the discharger was placed on the side opposite from the generator, so that the retorts were discharged practically direct into the generator; and to facilitate this, he reduced the length of the retort to 9 feet. If he had a coke-conveyor, it would appear that the conveyor would work with greater freedom on the opposite side of the bench. The only difficulty, he supposed, would be the filling of the generator. If there was a coke-conveyor, where was it situated? Was the charging-machine on the opposite side to the drawing-machine, or were they both operated from the one side?

Mr. Wilson, in reply to Mr. Smith, said that he used none of the side retorts in the charging of the producer. As a rule, the contents of the centre bottom retorts went into the furnace every time. The contents of the side retorts all went to the yard; and in many cases the top centre retorts went to the yard also. The producer did not extend to the whole width of the oven; it was only a little bit beyond the furnace. They had a coke-conveyor; but it was not in action, owing to subsidence in the floor, and even in the bench itself. This subsidence made the coke-conveyor subject to enormous wear and tear—so much so that, when they were altering the bench, they decided to do without it, and they ran the coke out at present in bogeys. They might revert to the coke-conveyor when they were satisfied that the bench was all right.

Absorption of Sulphur by Wall Plaster.—In a recent number of "Progressive Age," reference was made to some experiments carried out in the Arthur D. Little Laboratory of Engineering Chemistry at Boston (Mass.), in regard to the quantity of sulphur gases introduced into rooms through the burning of illuminating gas. A room was arranged for a series of tests by rendering it practically air-tight, and installing within it fans for stirring up the air and exhausting it at a rate to maintain the desired degree of ventilation. The room was plastered, as is usual in dwelling-houses, and the walls were papered. The object of the experiments was to find out to what extent the burning of illuminating gas increases the amount of sulphur gases while ventilation is maintained at the usual standard of air purity; and they showed that sulphur was absorbed by the plaster. After experiments had been made with good and with poor ventilation, and with a comparatively large and a small percentage of sulphur dioxide, due to burning gas, it was evident that the greater the sulphur dioxide content the faster it was absorbed by the plaster. The ceiling of the room was then papered, and the experiments repeated under the same conditions of ventilation. It was found that while the paper reduced somewhat the effectiveness of the plaster in absorbing the sulphur, it was sufficiently porous to interfere but little with the reaction between plaster and sulphur. Analyses of plaster scraped from the surface and near the lath, together with calculations, show that sulphur is quickly absorbed at the surface, and that the plaster on a 10 ft. by 18 ft. ceiling will neutralize for several centuries the sulphur coming from the burning of 25 cubic feet of gas per day, when the gas contains 20 grains of sulphur per 100 cubic feet.

THE "H.B." PATENT PUMP-VALVE.

THE characteristics which are most desirable in connection with a pump-valve are claimed to be embraced in Witting's patent "H.B." valve, orders for which have already been received from certain gas and water works. This automatic device, which is intended for use with pumps, pumping and blowing engines, compressors, &c., has been designed with the object of greatly increasing the capacity of these appliances (by rendering a greater speed of working practicable), and at the same time ensuring absolutely silent working. It is remarked by Messrs. Witting Bros., Limited, of No. 49, Cannon Street, E.C. (who are marketing the valve) that there is general recognition of the fact that one of the most troublesome limitations to the speed at which it is practicable to run reciprocating pumps is in respect of their valves, which should be of light construction to open smartly and afford a free and unimpeded water-passage, and must also close with equal promptness. If the moving parts are heavy, their inertia causes throttling at opening, and hammering at closing. These difficulties, they say, have been overcome in the "H.B." type of valve, which, owing to the lightness of the moving parts, will operate promptly, even at the highest speed of reciprocating pumps.

The requirements which the "H.B." valve has been designed to meet are that: (1) The closing portion should be so arranged that its movement is not impeded by the flow of the fluid passing through; (2) it should be as light as possible; and (3) it should have a small spring load, and thereby a low resistance.

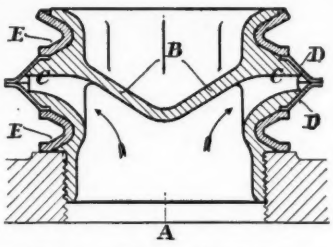


Fig. 1.—Section of "H.B." Valve.

In explanation of the invention, it may be remarked that the fluid to be raised enters at A (fig. 1) into a fixed body B; the latter being shaped in such a manner as to lead the current gently aside, and to allow the water to leave the body at the outer periphery through portholes C radially towards all sides. The moveable closing medium consists of two thin lip-rings D, made of brass or steel, which cover the portholes when the valve is closed. The outer edges or lips press against each other; and the conical part fits the body of the valve. The necessary closing force is afforded by the V-shaped rubber rings E, laid in corresponding grooves of the body, which press the metal rings against each other.

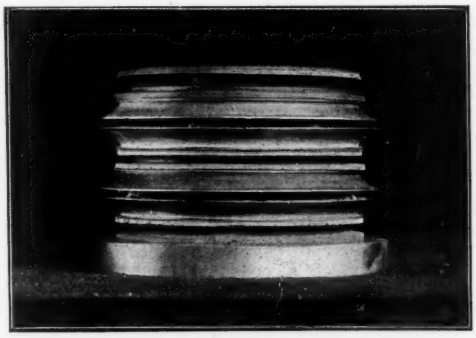


Fig. 2.—"H.B." Valve Open.

As to the fulfilment of the conditions aimed at by the inventors, it is pointed out that by the construction adopted the fluid is brought practically free of friction and contraction from the axial into the radial direction by means of the fixed body, and suffers no further variation in direction when going through the lips of the metal rings. By closing the valve, the fluid is easily diverted from the outer edges of the metal rings; while in disc or ring valves the fluid rising out of the seat must be forcibly restrained. The two metal rings which form the moveable closing medium are not heavy; they are only exposed to the water pressure over the narrow port-holes of the body; and they are extremely stiff, owing to their conical shape. Under these conditions, a very low spring power suffices to close the valve at the proper time, even in the highest speed pumps. The spring power is simply obtained by the annular rubber rings; and owing to the weak springs, the valve opens extremely easily, and thereby offers the least resistance to the fluid flow, by which considerable saving is obtained in the necessary pump work.

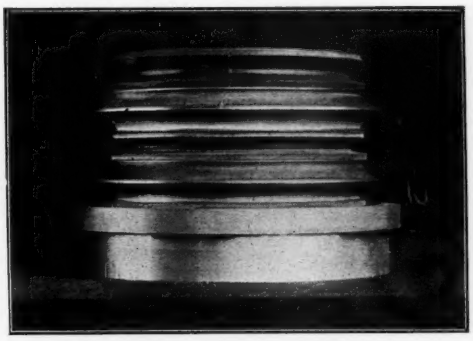


Fig. 3.—"H.B." Valve Closed.

It is pointed out by Messrs. Witting that it is possible, by retaining the principle and working method of the "H.B." valve, to make the constructional form in many ways, so as to adapt the appliance to all circumstances. "H.B." valves of several stages consist of single units laid loosely one upon the other, and held together by means of a cover or bolt. Thus special packing is unnecessary, as the rubber rings act as packing, as well as for springs. The metal rings—the parts subject to wear and tear—can be replaced easily and cheaply, no mechanical appliances or skilled workmen being required. The valves can be fitted to any existing pump; and one of the advantages claimed for them is that jamming is impossible. In the case of hot-water pumps, blowing engines, and compressors, the rubber rings are replaced by metal springs.

IGNITION TEMPERATURES OF GASES.

In the "JOURNAL" for the 30th of March (p. 907), we reproduced from the "Chemical News" an abstract of a paper on the above subject prepared for the Chemical Society by Professor Harold B. Dixon and Mr. H. F. Coward. The full text of the paper has now been published in the "Transactions" of the Society, and from a reprint forwarded to us by the authors we make the following extract.

The determination of the ignition temperatures of inflammable gases has been attempted by numerous investigators in various ways. The results obtained are widely divergent, not only for separate series of observations, but to a smaller extent in each series. The results of Sir Humphrey Davy (1816) are now interesting only from an historical point of view. He found that hydrogen and hydrogen sulphide inflamed when mixed with air at "the lowest visible heat of iron and charcoal." Ethylene and carbon monoxide were fired by both charcoal and iron heated to rednesss. Methane was not inflamed by an iron rod at "the highest degree of red heat, and the common degree of white heat;" but an iron rod "in brilliant combustion" succeeded.

Bunsen determined the limiting dilution of electrolytic gas with hydrogen, oxygen, and carbon dioxide beyond which the mixture was no longer inflammable. The temperature of the flame which travelled through the mixtures that were only just inflammable was calculated. This he regarded with some hesitation in the first edition of the "Gasometrische Methoden," as the ignition temperature of hydrogen. In the second edition he quoted only the corrected number for the oxygen dilution experiments as the ignition temperature—viz., 743·6°. Bunsen's method is open to two main objections—first, the fact that electrolytic gas alone does not ignite with an ordinary spark below 70 mm. pressure; and, secondly, the results obtained with different diluents are widely discordant, as 2116°, 1760°, and 857° are given for the ignition-points of hydrogen when carbon dioxide, hydrogen, and oxygen respectively are used as diluents.

More recent investigations may be classed into three main groups according to the experimental conditions: (1) A bulb containing the mixed gases was plunged into a bath at constant temperature; (2) a stream of the mixed gases was passed through a tube in a bath which was being gradually heated up; and (3) the adiabatic compression, just sufficient to cause ignition, was used to calculate the temperature of the mixture at the ignition-point. The results obtained by these methods for hydrogen and oxygen are collected in the following table:—

	Observers.	Ignition Temperatures.
(1)	V. Meyer, Krause, Askenasy	518°—606°
	Emich	589
		571—608 (with excess of O)
		575—607 (with excess of H)
(2)	Mallard and Le Chatelier	550
	Bodenstein	653—710
	Mitscherlich	674
	V. Meyer and Freyer	700
	Gautier and Helier	840
	Helier	845
(3)	Falk	540 ($2H_2 + O_2$)
		514 ($H_2 + O_2$)
		530 ($H_2 + 2O_2$)

It is to be noted that when the gases were heated in sealed bulbs

the pressure at the ignition-point was roughly three times the initial pressure; and when the gases were fired by adiabatic compression the pressure at the ignition-point was roughly 39 times the initial pressure.

The observations recorded for gases other than hydrogen are very few. Mallard and Le Chatelier found, by passing different mixtures of carbon monoxide and oxygen or air through a heated tube, an ignition temperature of 630° to 680°. Dilution with carbon dioxide raised the ignition temperature to 695° to 725°. These investigators also gave 600° to 660° as the ignition temperature of methane.

V. Meyer and Freyer obtained the following limiting values for ignition temperatures :—

Mixture.	Ignition Temperature of Free Current of Gas.	Ignition Temperature of Gas in Closed Bulb.
Methane and oxygen	650°—730°	606°—650°
Ethane and oxygen	606 —650	530 —606
Ethylene and oxygen	606 —650	530 —606
Carbon monoxide and oxygen	650 —730	650 —730
Hydrogen sulphide and oxygen	315 —320	250 —270
Hydrogen and chlorine	430 —440	240 —270

V. Meyer and Münch employed rather later the following improved method. The explosive mixture was passed through a capillary tube to the bottom of a small glass vessel inserted in the bulb of an air thermometer. When the mixture inflamed, the air of the thermometer bulb was displaced by hydrogen chloride and measured over water. This gave the temperature of ignition. The following are the results obtained :—

Mixture.	Ignition Temperature.	
Hydrogen and oxygen	620°—680°	
Carbon monoxide and oxygen	Combined quietly.	
Hydrogen sulphide and oxygen	Combined quietly.	
Methane and oxygen	656 —678°	
Ethane and oxygen	605 —622	Three experiments each.
Ethylene and oxygen	577 —590	
Acetylene and oxygen	509 —515	
Propane and oxygen	545 —548	
Propylene and oxygen	497 —511	
*iso*Butane and oxygen	545 —550	
*iso*Butylene and oxygen	537 —548	
Coal gas and oxygen	647 —649	

The chief source of disagreement in the preceding results is probably to be found in the influence of surface action. Thus the results of Helier and of Gautier and Helier were obtained by passing electrolytic gas through a tube packed with pieces of glazed porcelain—an experimental method which increased the slow surface combination enormously, and resulted in an ignition temperature nearly 300° higher than that found by Mallard and Le Chatelier.

In the method of adiabatic compression used by Falk at Professor Nernst's suggestion, fourteen experiments with electrolytic gas gave numbers from 518° to 569°, with a mean of 540°. In these experiments, ignition occurred under some 35 to 70 atmospheres pressure—a very different condition from that of previous experiments. Our experiments show that the ignition-point of electrolytic gas falls with increase of pressure. The present set of experiments is based on the definition of ignition-temperature as that temperature to which the gases must be separately heated so that when brought into contact they will inflame immediately. The method used by us was designed by Professor Dixon in 1903, the first apparatus being constructed by Mr. G. W. A. Foster, B.Sc. An atmosphere of oxygen or air passed slowly upwards through a large porcelain tube, the temperature of which could be gradually raised by means of an electric current traversing a close spiral of platinum wire wound round the outside of the tube. The inflammable gas was led up a narrow tube fixed in the axis of the larger porcelain one, so that the gases were heated to the highest temperature of the tube before they came into contact. The temperature of the gas was recorded by a thermo-junction inserted just below the orifice of the narrow inner tube. The flowing current of gas ensured the supply of fresh hot gas, and the removal of products of slow combustion. This arrangement also enabled the effect of surface influence to be minimized. Working with different tubes, we found that a constant ignition point was obtained when both the diameter of the outer tube and the rate of the stream of combustible gas issuing through the orifice surpassed a certain minimum value. With an outer tube of 45 mm. diameter and an orifice of 1 mm. diameter, the stream of hydrogen had to be passed at a rate exceeding 9 c.c. per minute to give a constant ignition temperature. The same constant was reached in a wider tube with a faster flow of hydrogen.

That the ignition temperature of a jet of hydrogen should fall with an increase in the diameter of the outer tube containing the oxygen, and for a given diameter of outer tube should fall with an increase in the speed of the jet, seemed explicable on two hypotheses :

I.—It might be supposed that a stream of hydrogen escaping very slowly into an atmosphere of oxygen would diffuse more rapidly into the oxygen than a quicker stream rising in an unbroken cylinder for some distance above the orifice. In the diffused gases, quiet combustion might begin, and the steam so formed, diluting the mixture, might raise the temperature of ignition of the residue. The difficulties of such an explanation are twofold. The quiet combustion would heat the mixture and tend to lower rather than raise the apparent ignition-point. And, secondly, when the hydrogen was diluted with nitrogen, or with steam, or with oxygen (which would form steam just before the gas issued from the orifice), no raising of the ignition-point was observed. Similarly, the substitution of air for oxygen in the outer tube made no difference in the ignition-point. The "dilution" hypothesis is therefore untenable.

II.—Since the gases inflame at a lower temperature when they are removed farther from the hot surfaces of the outer tube and from the hot mouth of the inner tube, these hot surfaces must retard the chemical action. Now, it has been shown by the photographic analysis of explosion flames that, when an explosive mixture is ignited in a tube by a small spark, the gases continue to burn with a nearly constant intensity for a comparatively long period, so long as they are undisturbed by compression waves. When a compression wave strikes such a burning mixture, the rapidity of combustion is greatly increased. In this way it can be shown that in a freshly ignited flame of electrolytic gas the number of "chemically fruitful" collisions between hydrogen and oxygen molecules is only a small fraction of the total collisions. On the other hand, from Maxwell's law of the distribution of speeds among gaseous molecules, we find that about 3 per cent. of the molecules have a speed twice as great as the "most probable speed." In a gaseous mixture the mean temperature of which is approaching the ignition-point, chemical action would begin among these more rapidly moving molecules. Now, the presence of a solid body at the mean temperature of the gas would tend to equalize the speed of the molecules coming into contact with it, accelerating the slow but checking the rapidly moving. The hot walls would therefore hinder the initial chemical combustion, due to collisions "out in the open," and *pro tanto* raise the ignition-point. But the solid wall would also take up the heat from such steam molecules as were formed on or near its surface, and prevent them from communicating their energy to the unburnt gases round them.

It may be assumed that the width of the outer tube chiefly affects the movements of the oxygen molecules, while the rapidity of the stream of hydrogen affects the movements both of the hydrogen and oxygen molecules as they diffuse into each other round the orifice of the inner tube. This hypothesis seems to account for the observations, and also to explain why, *cæteris paribus*, a larger orifice, by offering a less surface to the mixed gases, gives a lower ignition-point when the jet is issuing comparatively slowly.

The results we have obtained for the ignition temperatures of gases at normal pressure may be summarized thus :

Gas.	Ignition Temperature in Oxygen. Between.	Mean.	Ignition Temperature in Air. Between.	Mean.
Hydrogen	580° and 590°	585°	580° and 590°	585°
Carb. mon. (moist)	637 ,, 658	650	644 ,, 658	651
Cyanogen	803 ,, 818	811	850 ,, 862	856
Ethylene	500 ,, 519	510	542 ,, 547	543
Acetylene	416 ,, 440	428	406 ,, 440	429
Hydrogen sulphide	220 ,, 235	227	346 ,, 379	364
Methane	556 ,, 700	—	650 ,, 750	—
Ethane	520 ,, 630	—	520 ,, 630	—
Propane	490 ,, 570			
Ammonia	700 ,, 860			

In the remainder of the paper, the authors deal in detail with the various experiments they carried out.

Gas Companies' Accounts for 1908.—We have received from Messrs. John Allan and Co. the "'Gas World' Analyses of Gas Companies' Accounts for 1908." These accounts, as our readers may remember, are now issued separately from those of the local authorities. The accounts of 55 gas companies are analyzed; the results occupying two large linen-backed sheets. On the left-hand one will be found particulars relating to the coal carbonized, the percentage of carburetted water gas produced, the quantity of gas made, sold, and unaccounted for, the yield of residuals, statistics of revenue, &c.; while on the right-hand sheet are given the distribution and management charges, bad debts, net cost of gas, mileage of mains, number of consumers and public lamps, total capital and the capital per ton and per 1000 cubic feet, and the reserve funds. The book is similar in appearance to its predecessors, and the price is 10s. 6d. net.

Coal-Tar Dyestuffs in the United States.—This subject was dealt with by Herr J. F. Schoellkopf at the recent International Congress of Applied Chemistry. According to an abstract of his communication in the "Journal of the Society of Chemical Industry," the retarded growth of the coal-tar dyestuff industry in the United States, which, prior to the Tariff Act of 1883, was in a flourishing condition, is considered to be due to the unfavourable tariff legislation of the year named, when no less than five distinct factories were removed. The Tariff Act of 1897, however, made progress in the United States possible; and in the ten years next succeeding, the industry made greater strides than it had in the preceding thirty years. With a prospect of better tariff protection and of suitable modification of the patent laws, combined with a renewed supply of suitable coal-tar hydrocarbons to be obtained by the new systems of coking coal now being adopted, it seems not at all impossible that the United States may, in course of time, become exporters instead of importers of these dyestuffs. The total output of them in the United States is placed at 4,000,000 lbs., valued at considerably more than $1,000,000; and for the last ten years the rate of increase in domestic production has been about twice as great as that of the importations.

THE WORKING EFFICIENCY OF THE HIGH-PRESSURE GAS-PLANT.

By Alexander Waddell, of Dunfermline.

[A Paper read before the North British Association of Gas Managers.]

At last year's meeting, the author gave a few notes on high-pressure gas supply for a district 144 feet below the gas-works, and extending to 4½ miles therefrom. The supply required per annum was estimated at 2½ million cubic feet within the first three years—probably rising to 20 millions within ten years. It was noted that to deliver gas by the low-pressure system 144 feet below the works and holder level, would have necessitated far larger piping all round, on account of the pressure at the district supplied being so much under that at the holder. Consequently, the cost of gas would have been increased, making it unfavourable alike to consumer and supplier.

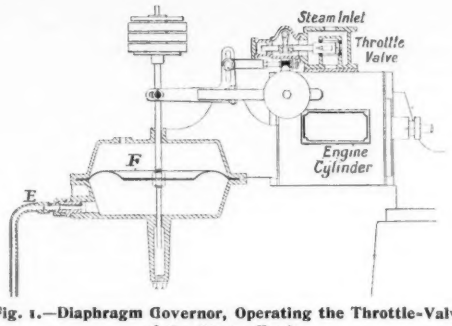


Fig. 1.—Diaphragm Governor, Operating the Throttle-Valve of the Steam-Engine.

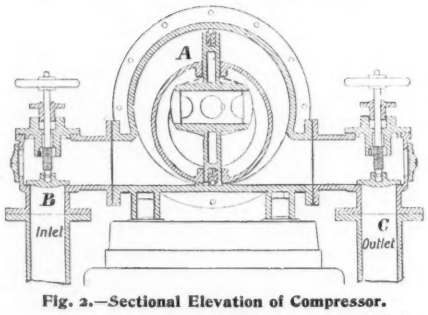


Fig. 2.—Sectional Elevation of Compressor.

These were among the principal reasons given for adopting high-pressure transmission just as it had been up to date, but with the difference that, instead of having the compressor regulated by an attendant in the usual way to pass a certain unknown quantity even comparatively, and maintain a certain pressure, neither had any relation to the unknown and the constantly varying demand of which even the attendant was entirely without guidance. The author proposed, and claims that he was the first to propose, to return a pressure from within the supply pipe so as to automatically regulate the compressor and maintain a predetermined and always sufficient, but not excessive, minimum pressure at the district to be supplied, however much the demand might vary—thus securing the greatest possible efficiency of compressor and piping with the minimum size of plant and total cost.

The plant was started last October, and has worked for the past nine months in a way that is completely satisfactory. The drawings show a side view of the principal portions of the plant erected at Dunfermline. A is the compressor; B the inlet to the compressor; C the outlet of the compressor; D an automatic high-pressure safety bye-pass valve (referred to later); E the small return pipe by means of which the pressure away at the area of supply is transmitted to the apparatus for controlling the speed of the compressing plant; F a diaphragm controlling apparatus, the function of which is to automatically regulate the speed of the compressor in order to maintain a uniform (and predetermined) pressure in the area of supply, and which pressure is introduced to the underside of the diaphragm; G is a combination trap, test, and inspection box, &c.

The plant consists of a vessel containing a horizontal leather diaphragm, on top of which, and fixed thereto, is a metal plate and vertical spindle. This spindle is guided in, and extended through, the top cover of the vessel, and terminates in a weight carrier. The weights placed on this carrier balance the pressure of the gas which is on the underside of the diaphragm, in whichever position it may be occupying at the moment. The vertical movement of the diaphragm and spindle is transmitted to the lever of a steam throttle-valve on the engine by a suitable system of levers.

To follow the controlling action of the apparatus, let us assume that weights have been placed over the diaphragm requiring 6 inches of pressure under it to lift it. On starting the engine, the result must be that the pipes will be filled with gas at a pressure rising to 6 inches (at the far end of the district to be supplied). This pressure is conveyed to underneath the leather diaphragm and lifts it; the diaphragm in turn rising and controling the steam throttle-valve and compressor so as not to allow more than the predetermined 6 inches of pressure on the one hand. On the other hand, when the diaphragm tends to fall, more steam is supplied to the engine—causing the compressor to give a pressure not less than the 6 inches predetermined; so that a constant balance of weight over and pressure under the diaphragm must be obtained so long as the compressor has power to do so. It governs not only the gas pressure in the district (as does a governor); it also governs the compressor. While the weight above and the pressure below are constant, it will be observed that the diaphragm must rise and fall in accordance with the steam required or the demand made for gas.

You may ask the following questions: (1) How does it work? (2) With what efficiency? (3) Is it reliable?

In regular working the pressure in the high-pressure main over 24 hours varies only about half-an-inch. During a temporary obstruction (probably naphthalene) which passed away as it came—leaving no definite indication of what it really was, though all water-traps were visited and found quite dry—I took a record of pressure on the supply district and found that it remained as usual, although the engine had to raise the pressure to 23 inches at the outlet of the compressor to do so. It will be evident to you that, although an obstruction should take place and be great enough to require the full power of the compressor with steam full on, the plant would still automatically maintain the minimum pressure in the supply district which it was set to give, and could only fail to do so on account of an accident or want of power of the compressor.

This result differs widely from what occurs when we depend on a stated maximum pressure at the outlet of the compressor or governor, and shows how the compressor and piping combine in this form of plant to render automatically the best possible service.

Another record of pressure taken when the cover H (fig. 4) was off—making an opening nearly equal to the area of the pipe—showed a fall of pressure of 8-10ths; and when another cover was put on, the pressure recovered itself.

These and other tests I have made are more severe than would take place in actual practice. The largest variation of pressure is from 7 to 8 inches, which is not at all excessive or such as would disturb the consumers, and is a smaller variation than is obtained with ordinary low-pressure distribution.

After the plant had been working for some time, it was felt that provision should be made against any breakdown or stoppage of

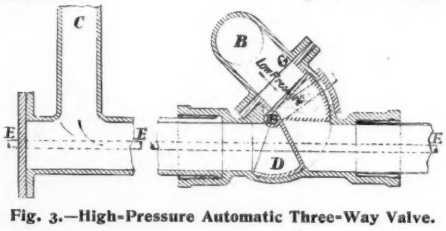


Fig. 3.—High-Pressure Automatic Three-Way Valve.

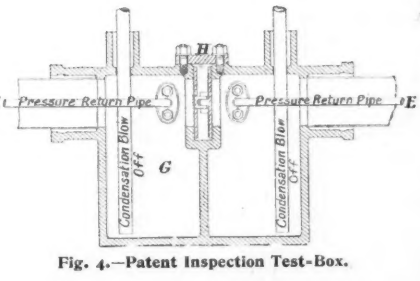


Fig. 4.—Patent Inspection Test-Box.

the compressor; and, after considering all that was possible in this matter, the bye-pass valve D was designed to meet the following requirements: 1st. That it should have no water or other lute, as it will have to work with a pressure up to 20 lbs. or perhaps more. 2nd. That it should bye-pass the moment the initial pressure of the gasholder exceeds that at the outlet of the compressor. 3rd. That it should shut the bye-pass when the compressor was restarted. 4th. That it should not be subject to stick; and that it should be automatic and reliable in its action.

The design of valve shown is one suited for large-sized plants. C is the outlet pipe from the compressor to the supply district; and B, the bye-pass from the inlet to the outlet of the compressor. D is the moving part of the valve. It is box form; the side view being triangular (the front, not shown, is square). It is hinged at F, and the bearings are at G. The position it is shown in is that which it occupies with the compressor standing. The dotted lines show its position when the compressor is working. When the compressor starts, the first thing it must do is to raise the valve to where it is shown in dotted lines, shutting the bye-pass before any gas can pass to supply the district. This is not obtainable in a flap or plate valve, which would open partly when the compressor started, only to allow the gas to be pumped round from the outlet to the inlet of the pump, but would give no high-pressure delivery to the district. Another point is that the moving part is held up against a face (which is unlikely to get dirty or sticky) and out of the way when compression proceeds. Then it

has all its weight if necessary to enable it to fall and bye-pass, and the full power of the compressor to shut it against bye-passing and hold it there. Hence its reliability.

I have for inspection an enlargement to full size of some automatic records of tests made to show how the valve responds to any stoppage or breakdown of the engine and sudden changes in the consumption of gas. These pressure records, drawings, and descriptions show how the plant answers its purpose and with what efficiency and economy. In its working there has been no trouble; and it has given satisfaction to all concerned—including the consumers, although they pay considerably more per cubic foot for their gas than the people in Dunfermline. The author believes this is in no small part due to the somewhat higher and distinctly more uniform pressure that is obtainable than under ordinary circumstances.

Just one little difficulty in the erection of this plant may be noted. It was found after a large part of the block-tin tube was laid inside the supply pipe, that there were a number of small holes in it, owing to little pieces of hard parts in the metal which did not stretch like the rest of the pipe and as it was drawn into supply caused the holes. It was fortunate, therefore, that we were able to withdraw the tube at the combination water-trap, test, and inspection boxes, and to replace it with other tube with a minimum of trouble.

Discussion.

The PRESIDENT said they would remember that last year Mr. Waddell gave them a description of his plant. He was now in a position to speak of his actual results.

Mr. D. VASS (Airdrie) quite recently had brought before him a question regarding the supply of gas to a low-lying district in the town; and in view of what had been placed before them by Mr. Waddell, he went to Dunfermline and saw Mr. Waddell's plant. He was greatly satisfied with the manner of working it. He examined the plant minutely, and saw it under almost all the tests Mr. Waddell had described that day. The draining-off from the high-pressure main, which might, on special occasions, be due to the starting of gas-engines, was a feature of the working which struck him. The plant answered admirably to the call, and sent out a larger volume of gas to the outlying district. They required something of this sort to maintain a steady pressure in places where a gas-engine might be started at a time when they knew nothing at all about it. As the plant was used at Dunfermline, it at once sent out an extra supply of gas, without any man being near it at all. He understood that one of the difficulties Mr. Waddell had was with reference to the tube inside the main, and that he substituted a lead for a compo. pipe. He would like to know what Mr. Waddell would say about a malleable iron tube being put in, instead of lead, and just coupling-up near the inspection-boxes. Mr. Waddell's arrangement admirably answered the purpose for which it was put in. The valve described, particularly, worked very sweetly. He saw the engine stopped, and the valve fell immediately the pressure was taken off.

Mr. J. D. KEILLOR (Lochgelly) said there was one thing which he thought Mr. Waddell might have gone more fully into. That was the working costs—the costs of compression, maintenance, and so on. With regard to the bye-pass valve, he presumed it was patented, or that it was some idea of Mr. Waddell's own. He (Mr. Keillor) had a valve fixed on his plant, between the inlet to the blowers and the outlet of the blowers. It was an ordinary flap-valve, with the flap opening, of course, away from the inlet to the blowers. Immediately the blowers were started, and the pressure was raised, the high pressure came back on the flap-valve, and closed it. Of course, the high pressure flowed past the flap-valve to the district; and directly the compressors were stopped, and the pressure became reduced to the low pressure, the low pressure on the holders blew the flap open, and closed it from the district. This was an entirely different system from that used at Dunfermline by Mr. Waddell, inasmuch as Mr. Waddell employed continuous high pressure. At Lochgelly, he distributed gas at a pressure of about 2 lbs. per square inch. There was no trouble whatever with the blowers. They had had something like eighteen months' experience with the high-pressure plant; and since they started the blowers, the consumption in the district supplied had increased by fully 150 per cent., while unaccounted-for gas had not increased, though this might have been expected. They, however, conducted very systematic searches for leakage, and could afford, of course, to scoff at the old bogey of increased leakage from increased pressure. The amount of gas delivered during the last eighteen months was fully 9 million cubic feet; and the cost of compression was 0·68d. per 1000 cubic feet. The maintenance of the blowers and plant cost only about 0·15d. per 1000 feet; and the attendance on the apparatus had practically cost them nothing. From the time they started the blowers till they stopped them, they never required to go near them. The figures he had given were for the benefit of the meeting, and for the sake of comparison. They had never regretted putting down the high-pressure plant. It was a necessity when they considered it at the beginning. They were always extending the system, and would continue to do so, he believed, as circumstances required.

Mr. J. W. NAPIER (Alloa) thought the author was to be congratulated upon having conceived a design of apparatus whereby absolute, direct, and sensitive control was obtained of the conditions of pressure from the works to the consumer, in an area situated miles away from the manufacturing station. In his (Mr. Napier's) opinion, the return pipe was absolutely essential, and more particularly so when the demand for gas in a populous area was large, and when, on account of various circumstances, the demand might be required suddenly. The return-pipe was essential, on the same lines as in electricity departments, where a return-wire was laid in conduits along with electric cables, for the purpose of informing the attendant at the station what the demand was in the town. He merely mentioned this to show that electricity supply was, so far as that feature was concerned, worked precisely the same as the method adopted by Mr. Waddell. The valve, which he understood was the subject of a patent, appeared to be a success, and he understood had been, to various manufacturers, a much felt want. At Alloa, he had occasion to consider the question of a high-pressure supply to an outlying district, the pipe to which was laid about thirty years ago. Owing to the comparatively small consumption in the area, it was not considered practicable to lay a new pipe. He mentioned the circumstance, as it might be of advantage to others to know what could be done in such a case. He simply connected a small rotary compressor, driven by a 2 H.P. electric motor, to one of the street mains. In this respect, his arrangement differed from Mr. Waddell's, in so far as it drew the gas from one of the street-mains, thereby saving the expense of taking a special pipe from the gas-works. The cost of running the compressor was exceedingly small—only about 0·75d. per hour. The compressor was put to work during the lighting hours; the main-pipe being sufficiently large to meet requirements at other times.

Mr. C. W. KRAUSHAAR (representative of the Bryan Donkin Company, of Manchester) said he had seen the plant working at Dunfermline, and had had it under very stringent tests. It appeared to meet all the requirements, as desired; and, as the manufacturers, of course, they were pleased to find that it had turned out so satisfactory. The special valve he had had under many tests; and he could speak to its working admirably. He could testify to this more particularly as it was not of his firm's manufacture.

Mr. W. B. M'LUSKY (Perth) thought that Mr. Vass put the matter clearly when he indicated the case of a gas-engine starting and giving rise to a sudden demand in a remote district, because, however sensitive their station-governors might be, it was not to be expected that a station-governor, on a 15-inch main, would respond to a sudden demand. If he might cite another case, it was that which Mr. Napier had met in Alloa, where he distributed from a fairly large main, and carried the gas to a comparatively remote part of the district. His own experience had been different from either of these cases. They supplied the village of Bridge of Earn, about 4 miles from Perth, with gas at a moderately high pressure—starting with 12 inches. The plant had worked about eleven months. They used a Sturtevant blower. His object in deciding upon this was that it had advantages for his purpose over any of the systems which had been put before them that day. He had to meet variations in pressure of from ½ to 2 inches; but these variations did not disturb the action of the plant. A Peebles governor acted as a perfect governor, as it would act, in ordinary circumstances, on a consumer's meter. The only cost they had found computable was that of lubrication; and this, of course, had to be carefully attended to. Otherwise, in regard to attendance, the cost was infinitesimal.

Mr. WADDELL, in reply, said Mr. Vass mentioned the matter of putting in an iron pipe, instead of a lead one, as he ultimately had to do. He was hardly inclined to say the last word on this subject. He thought it was better for everyone to consider for himself. He had told them of the difficulty he had had with block tin. He hoped it was quite understood that, in drawing in a pipe, it generally stretched; and in the case of the block-tin pipe, when it had stretched, a number of small holes were found. He had been told that block tin would be the best material to use; but he found it otherwise. With regard to what Mr. Keillor had said, he really could not put a figure upon the cost of working. The plant gave them no trouble. The engine ran so slowly that it would go long enough without any oil; and, apart from this, it required no attention, either morning or night. It was one of the economies of the system that, instead of having a pressure of 16 inches at the outlet, and perhaps 60 inches at the other end, while there was a small consumption on, and, again, having 60 inches at the outlet when, at night, they would have very much less at the other end—which looked to him to be waste—they had a more uniform pressure throughout. His idea was to get over this waste, and to give only the amount of pressure required at the other end, without any waste, so far as he could manage. This was what he had done. He was not aware that, if they left it alone for two days on end, there would be a bit of harm. The apparatus worked without any attention. Mr. Keillor mentioned the valve. The point about the valve was that it lay down unless the engine were working; and when it had to be raised, it was the compressor which raised it. It was the pressure which kept it up. It therefore did not cost anything to hold it up. When the compressor was stopped, it had its own weight to close it. He was almost compelled to do something in this respect, because, while their large holder had a pressure of 6 inches, the other holder had only about 4 inches; and considering that the district to be supplied was below them, he would have had nothing to work with at the other end. But the valve operated satisfactorily. He considered a safety bye-pass valve; but the difficulty in connection with it was that, when working with considerable pressure, the pressure would displace

the seal. This valve took away no pressure at all. Mr. Napier, as well as Mr. M'Lusky, had introduced high pressure, of a form to suit his own circumstances. He did not claim that his system was the thing to cure all evils. It was for each to think out matters for himself; but it had to be pointed out that, under both their systems, they only provided for a partial high pressure supply. In his case, he required a very low high pressure; but he was obliged to have the engine working through the whole 24 hours of the day. There was all the more reason why it should not be required to work against 60 inches pressure, when it was only necessary, for the purposes of supply, to have it working with 8 inches. Whenever it came about that a large supply was wanted, the apparatus naturally started itself. He had no doubt the partial stoppage they had was due to naphthalene. They noticed it about 8 o'clock at night, when the engine was required to work against 24 inches of pressure. He sent round to see what the drips were like. It was found that there was no water whatever in them; and then, in the morning, they saw that the pressure had come down to 8 inches. As long as the engine had power enough, and steam given to it, it went on supplying the pressure which they wished it to give.

A high-pressure pumping-station on Delaware Avenue, Philadelphia, described in "Engineering Record" some time ago, has proved so successful that it will be practically duplicated at Seventh and Lehigh Avenues, in the city's mill district. It will contain ten 300 H.P. Westinghouse vertical single-acting gas-engines direct connected to Deane triplex pumps and a 140 H.P. unit for auxiliary purposes. Fuel gas will be drawn from the street mains, and two large holders in different parts of the city will furnish the supply. Experience with the present plant indicates that any unit can be made ready to pump against 300 lbs. pressure in 45 to 60 seconds from the time the signal is received; and the whole station can be put in operation in from seven to ten minutes.

Presentation to a Cardiff Gas-Works Official.—Mr. Thomas Foster, who has been in charge of the Bute Terrace works of the Cardiff Gas Company for a period of nearly thirty years, was a fortnight ago made the recipient of valuable tokens of goodwill and friendship from the officials, staff, and employees of the Company on his retirement. The presentation, which took the form of a gold watch, a beautifully illuminated autograph album, and a fountain pen, was made on behalf of the subscribers by Mr. George Clarry, the General Manager, who testified to the faithful services rendered by Mr. Foster during his long connection with the Company, and to the good feeling and loyalty which have always been a marked feature of his supervision. Mr. Foster feelingly acknowledged the gifts. A silver-mounted umbrella was also presented to Mrs. Foster.

The Calorific Power Test for Coal Gas.—In the course of an article by Professor Frank Clowes, D.Sc., F.I.C., the Chemist and Chief Gas Examiner of the London County Council, in the Engineering Supplement to "The Times" last Wednesday, he made the following remarks: "A clause has been recently inserted in a London Gas Bill which renders obligatory the maintenance of a reasonable standard of heating power in the gas supplied by the largest Metropolitan Gas Company—a Company which is responsible for making and distributing more than half of the whole amount of illuminating gas used in the County of London. This marks an advance in gas legislation, since, although special gas supplied for power purposes had already necessarily been of standard heating power, no company distributing ordinary coal gas at all comparable in importance with this greatest Metropolitan Company has hitherto adopted a calorific standard. . . . It is generally felt by those concerned with the gas supply to towns that the introduction of the calorific test marks an era, and that the example which has just been set by the largest Gas Company will be followed, as opportunity arises, by gas authorities generally. The consumer of gas will then pay for his gas as a heat generator; its value being mainly fixed for him by the calorific test."

Specification for Standard Cast-Iron Pipes.—The Engineering Standards Committee have just issued the British standard specification for cast-iron pipes for hydraulic power. The Committee engaged in drafting the specification met for the first time in June, 1904, and information as to current practice was sought from the principal users and manufacturers of hydraulic pipes, resulting in a mass of valuable information being placed at the disposal of the Committee. It was found that cast-iron pipes for hydraulic power as generally used fell naturally into two divisions, the greater number being for pressures from 700 lbs. to 900 lbs. per square inch; while in recent years much higher pressures, from 900 lbs. to 1200 lbs. per square inch, have been extensively used. Two standard series have, therefore, been drawn up to suit these respective ranges of pressure. The Committee regard 900 lbs. per square inch as the maximum permissible pressure for Class A, and recommend that Class B should be used when a working pressure of 900 lbs. per square inch and upwards is the normal working pressure. As regards the leading dimensions, the Committee have endeavoured, as far as possible, to fall in with the general practice in existing work as indicated by the replies received. In nearly every case it has been practicable to adopt dimensions which will allow pipes made to the standard specification to be connected to existing pipes without alteration.

ANALYSIS OF GASEOUS MIXTURES.

In the "Chemiker Zeitung" for the 3rd inst., Herr G. von Knorre deals with the estimation of hydrogen, methane, and nitrogen in gaseous mixtures. In an abstract translation of the communication in the "Chemical Trade Journal," it is pointed out that, where the more usual methods are followed, the nitrogen value has to bear the sum of all the errors; and hydrogen and methane are not determined with as much accuracy as could be wished by any of the methods which involve the explosion of a portion of the gas residue with air or oxygen. Fractional combustion with heated copper oxide, as suggested by Jaeger, enables the whole of the gas residue to be used in the experiment; but there are two drawbacks to the method as originally described. In the first place, a correction has to be applied for the oxygen of the air in the copper oxide tube at the beginning of the experiment; and, secondly, and of more importance, the Jena glass tube containing the copper oxide is liable to become distorted and change in volume. Herr von Knorre finds these difficulties can be wholly overcome by constructing the copper oxide tube of quartz glass, and filling it with nitrogen. The method is as follows: The carbon dioxide, heavy hydrocarbons, oxygen, and carbon monoxide are estimated in the usual manner by absorption. The residue is then passed slowly backwards and forwards two or three times from the burette or nitrometer into the potash pipette through the copper oxide tube, which is so arranged as to connect the burette to the potash pipette. The copper oxide is maintained at a temperature of 230° to 250° C., by which means the whole of the hydrogen but none of the methane is oxidized. After cooling, the reduction of volume is noted, and is the measure of the hydrogen. The heating and passage of the gas backwards and forwards is next repeated; but this time a bright red heat must be employed. The reduction in volume is the measure of the methane. The method not only does away with the necessity for batteries, coils, mercury, and palladianized asbestos, but provides a simple means of directly estimating the nitrogen. The gas is simply passed to and fro over the strongly ignited copper oxide, and the residual nitrogen is measured. Methane, too, can be quickly estimated, if the heavy hydrocarbons be absorbed by fuming sulphuric acid, and the other combustibles, save methane, burned at 250° C., at which temperature the heavy hydrocarbons are not oxidized by copper oxide.

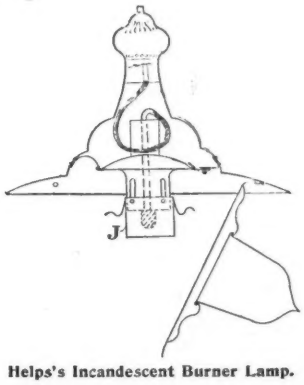
REGISTER OF PATENTS.

Incandescent Gas Lamps and Burners.

HELPS, G., of Nuneaton.

No. 7548; April 6, 1908.

Lamps constructed according to this invention have "all parts readily accessible" and the inverted mantles need never be exposed to winds, with consequent risk of destruction.



Helps's Incandescent Burner Lamp.

The chimney or casing which surrounds and supports the burner is hinged to the outer casing of the lamp and carries a sleeve J adapted to be lowered for the protection of the mantle. The sleeve is provided with arms or projections which normally rest upon the door; and the burner is attached to the gas supply by a flexible tube or a swivel joint or the like, as described in patent No. 13,648 of 1907. In place of supporting the sleeve on the door, and allowing it to fall automatically on lowering the door, it may be normally a fixture upon the casing, but capable of being released by hand after the removal of the door.

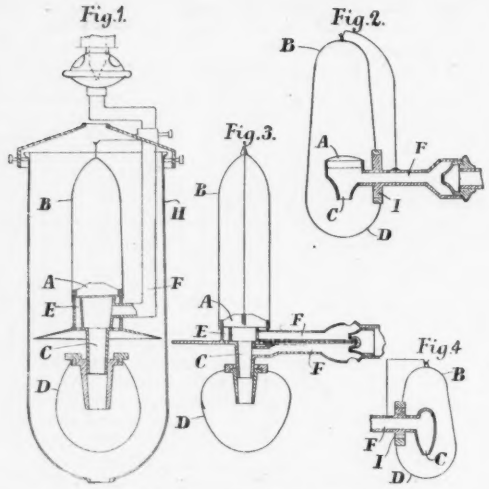
"Twin" Incandescent Gas-Lamps.

EDDRUP, E. C. P., of Kensington, W., BOUGHTON, H. F., of Birmingham, and EVERSON, W. H., of Willesden, N.W.

No. 13,754; June 29, 1908.

This invention has for its object to so arrange incandescent burners and mantles that a large portion of the amount of heat wasted in the ordinary arrangement is utilized "in creating more light, and consequently the consumption of gas is economized."

Fig. 1 shows one form of combined burners, mantles, and globe.



"Twin" Incandescent Gas-Burners.

Fig. 2 shows the burners and mantles where the inverted and vertical mantles are made in one or combined. Fig. 3 is a modification whereby the gas and air mixture supply to the combined inverted and vertical burners is separated. Fig. 4 shows the combined vertical and inverted mantles with an inverted form of burner only.

In figs. 1 and 3, a vertical burner A and mantle B are arranged immediately over an inverted burner C and mantle D, "in such a manner that any heat which has not been absorbed by the inverted mantle, and so transformed into light, passes up through the part E of the combined burners and is collected and absorbed by the vertical mantle B, and so utilized, and the consumption of gas thereby economized." The burners (with fittings and globes required for the two forms of lights) may be combined in one device as shown at fig. 1, where H represents two globes made in one—the lower part surrounding the inverted mantle and the upper part the vertical mantle. In order to better conduct the waste heat from the inverted to the vertical mantle, a transparent shield or baffle is used.

In fig. 1, the mixer F supplies the gas and air to the combined burners A and C, placed in juxtaposition; but in fig. 3, two mixers F are employed in juxtaposition—one for the vertical and one for the inverted burner.

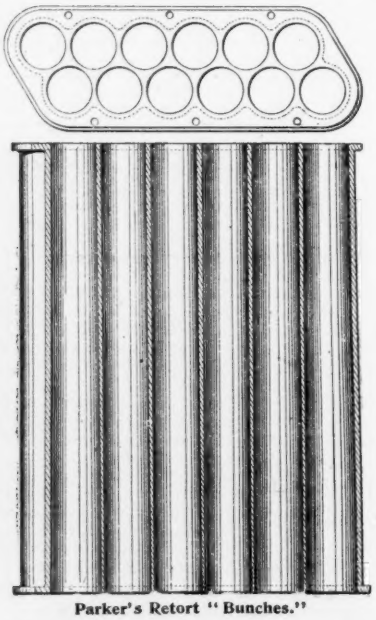
In fig. 2, the vertical and inverted mantles are made in one, and the combined burners are arranged at the end of the mixer F with a suitable fitting I, whereby the mantles are steadied. In fig. 4, an inverted burner only is used, and the vertical and inverted mantles are combined, so that part of the heat arising from the latter, or from the combustion of gases issuing from the inverted burner, will be absorbed by the vertical mantle—that is to say, "the heat which is not absorbed by the mantle D will become absorbed by the mantle B, and so be turned into light and not wasted as hitherto."

Retorts for the Destructive Distillation of Coal or Other Carbonaceous Substance—"Coalite Process."

PARKER, T., of Wednesfield.

No. 14,169; July 3, 1908.

This invention has for its object "to provide retorts of simple construction in which the charging of the substance to be destructively



Parker's Retort "Bunches."

distilled may be readily effected, and from which the residue may be expeditiously discharged."

Fig. 1 is a plan of a "bunch" or battery of retorts, and fig. 2 is a sectional elevation.

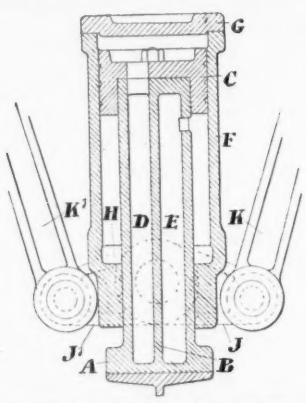
The series of tubes shown (of small diameter) are cast integrally together with their upper and lower extremities in one, with common top and bottom flanges or fittings—thus forming integral bunches or batteries of tubes. These respective batteries are mounted in the manner described in patent No. 4266 of 1908—that is to say, upon the upper flange is provided a hood common to all the tubes or retorts of each separate bunch or battery, forming an upper chamber above the tubes, from which the gases and vapours produced in the destructive distillation may issue through an ascension or discharge pipe communicating with the side of the hood—the hood being provided with a hinged cover-plate, which, when the tubes are to be charged, is removed to permit of the funnel of the charging hopper passing into the mouth of the hood and to allow ground coal or other carbonaceous substance to fall into the respective tubes. The lower mouths of the tubes of each battery or bunch are closed by a common cover-plate hinged so that it may be removed to fall away from the lower mouths of the tubes to permit of the charge falling out. Each bunch or battery of tubes is connected by its own pipe to the hydraulic main.

Closing the Doors of Retort-Stills.

PARKER, T., of Wednesfield.

No. 14,170; July 3, 1908.

This invention is more especially designed "for the purpose of opening and closing the cover-plates or doors of retort-stills used in the destructive distillation of coal, and for the purpose of effecting the closure with certainty and precision and for ensuring a gas-tight joint."



Parker's Retort-Still Lid-Closers.

The hollow standard A is provided centrally with a longitudinal partition B, forming two inlets for water or other liquid under pressure; and upon the top of this standard is mounted a piston C, and communication from above the top of the piston is made with one of the compartments D of the standard A and through the side of the standard from beneath the piston with the other compartment E. Upon the standard and the piston E is mounted a movable cylinder F, the lower extremity of which is suitably packed to ensure a good hydraulic joint; while, similarly, the piston C is packed for the same purpose, and the cylinder is provided with a cover-plate G.

On the admission of water under pressure to one compartment D in the standard, it will pass upwards above the piston C and lift the cylinder F; while, similarly, when water under pressure is led into the other compartment E, it causes the fall of the cylinder.

The hydraulic device for operating a set of closing cover-plates or doors is disposed intermediate of the doors or cover-plates to be operated by a lever H pivoted centrally at the lower extremity of the cylinder F and, at the extremity of one arm J, pivotally connected by a link K to one cover; while the other, J^1, is pivotally connected by a link K^1 to another, in such a manner that on the cylinder being raised the set of covers are closed, while when the cylinder falls they are opened.

Manufacturing Producer or Water Gas.

PETTIBONE, H., of New Rochelle, U.S.A.

No. 19,363; Sept. 15, 1908.

This producer-gas, or mixed producer-gas and water-gas, plant refers particularly to that type in which connected pairs of generators or producers are employed from which the gas is drawn off by jets of compressed gas which operate as an exhauster, and in which the sensible heat of the gas is utilized as well as the latent heat of combustion in a metallurgical furnace.

The patentee provides for drawing off a portion of the gas, scrubbing and cleaning it, operating therewith a gas-engine, and thereby operating a compressor to compress part of the cleaned gas for use in the jet-exhausters, which serve to draw hot gas from the generators and deliver it to furnaces. He also provides for reversing the action of either one of the jet-exhausters on a pair of connected generators or producers, producing a reverse current through one of the bodies of incandescent fuel, thereby causing pressure in one of the producers and vacuum or partial vacuum in the other one, and at the same time cleaning the fire of dust and ashes.

By the use of the devices and the apparatus described at great length (by the aid of a series of diagrams), he is able to "reduce the cost of a fuel-gas and power plant of a given capacity," as he dispenses with positive rotary exhausters, steam-engines therefor, boilers, and connections, &c., and "yet preserves the efficiency of the plant."

Intermittently Illuminated Gas-Signs.

ULLRICH, R., of Berlin.

No. 15,630; July 23, 1908.

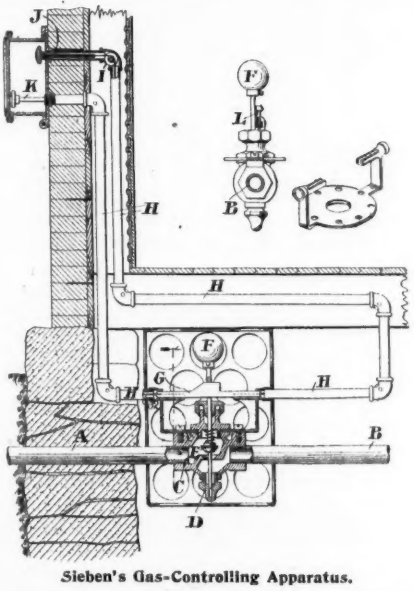
The patentee points out that appliances for the kindling and extinction of gas-flames are known in which a float or membrane connected with a cut-off member, owing to the alteration of the gas pressure, is given a movement which opens or closes the cut-off member. Or the periodical supply of gas to the burners is regulated by means of a bell, which, owing to the arrangement of valves, automatically becomes alternately filled with, and emptied of, gas, whereby the actuation of the valves is produced by the bell by the intermediary of a trip lever. Yet another known arrangement is the automatic displacement of the gas supply-valve by means of two bellows, which are alternately filled with gas and emptied. The present invention provides apparatus for producing an intermittent light for advertising signs, giving signals, and so forth, in which the member serving for the periodical cutting-off of the current of gas supplied at a constant or fluctuating pressure is worked by a body operated by the gas pressure itself, whereby the duration of the separate periods is not dependent upon the quantity of gas passing through the apparatus in a unit of time.

Gas-Controlling Apparatus.

SIEBEN, H., of Kansas City, U.S.A.

No. 20,049; Sept. 23, 1908. Date claimed under International Convention, Jan. 24, 1908.

This apparatus is designed for use in connection with buildings, to permit the gas supply to be cut off manually in the event of fire or automatically if it is subject to a predetermined heat.



Sieben's Gas-Controlling Apparatus.

The illustration shows a sectional view of part of a building and part of the gas-controlling apparatus, with a part section and a detail perspective view of a bracket later on referred to.

A is the gas-pipe leading from the main to a valve casing; the house pipe B leading from the casing into the building. The valve has a perforated diaphragm C between pipes, and below the perforation of the diaphragm is equipped with a removable cup D, having its chamber reduced to provide a guide passage for the stem of a valve E. The stem is fitted with a spring bearing at its lower end upon the valve, and at its upper end against a cap closing an opening in the valve casing above the diaphragm, and forming, in conjunction with the cap nut, a guide and stuffing box for the valve stem. The spring thus tends to seat the valve and cut off the supply of gas from pipe A to pipe B; and to co-operate with the spring in closing the valve, the stem may also be provided with a weight F.

To normally hold the valve unseated, a roller is secured by a fusible substance to the valve stem; the roller resting upon the cam trackway of a reciprocatory bar G. The guides of the bar terminate in circular heads to receive the ends of a pair of similar conduits, preferably consisting of tubes H coupled together by elbows and leading to any point desired. The couplings in their inner sides are slotted as at I, in order to permit guide-rollers to be fitted within them; the parts being so proportioned that cords (hereafter referred to) cannot be disengaged from the rollers. As shown, the ends of the conduits opposite to the coupling heads of the guide-bracket extend through the wall of the building contiguous to which the valve is arranged and into which the supply pipe A extends.

One end of a cord or cable is preferably secured in the tube J, and the corresponding end of another cord is secured to a tube K, which tubes project into a glass face box, and are equipped with handles. The cords thus never become exposed in the box when the handles are pulled forward, and consequently cannot sag from the front end of the conduits and interfere with the free operation of the slide bar G. When the slide bar is in the position shown, the lower handle is drawn forward and the upper handle is in contact with the contiguous end of its respective conduit. Should the building take fire and "gain considerable headway before it was discovered," and the heat rise to a predetermined degree, the connection between the valve stem carrying the weight F and the angle bracket L would fuse, and, as a result, the valve E would automatically close and cut off the supply of gas to the building. Should the house occupant discover the fire before the heat was sufficient to fuse the connection mentioned, he could pull forward the top handle, and so slide the bar G to the right and permit the valve to close. To reset the valve in the event that the bracket L remained fastened to the valve stem, the lower handle would be drawn forward—reversing the operation of the bar G, and causing the cam to engage the roller and force it, and hence the valve E, upward to their original positions.

Prepayment Gas-Meters with Differential Wheel Gear.

KETTERER, F., of Furtwangen, Germany.

No. 22,088; Oct. 19, 1908.

This invention relates to the type of prepayment gas-meters wherein, by means of differential gear, the movement of the cam which actuates the gas-valve is derived from the turns, or the initial turn, of a coin receiver in the one direction (for opening the valve) and reversed by a rotation of the counting spindle acting in the other direction, so as to tend to close the valve—the spindle also actuating the indicator of the consumption of gas. Consequently, several successive prepayments, each effected by one rotation of the spindle, are rendered possible without a further operation of the meter being dependent on the previous closure of the valve.

The operating mechanism is chiefly characterized by the peculiar arrangement of a two-wheel differential gear, the parts of which simply consist of an internally toothed pericyclic wheel and an externally toothed epicyclic wheel, which intermesh with each other in the same plane. This dispenses with the employment of spheroidal screws and other like means coacting with the differential gear as in known prepayment meters.

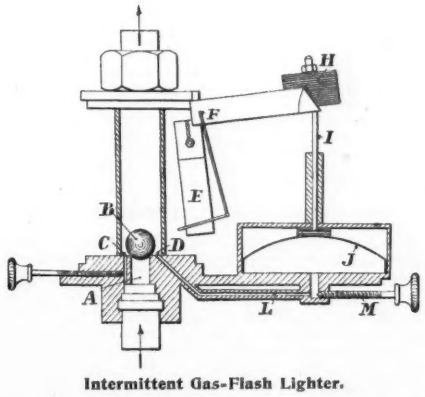
The patentee's claim is for a prepayment meter comprising a coin receiver adapted to be rotated by hand after the insertion of a coin and transmitting its rotation to a valve-controlling disc through the medium of differential gear actuated, on the other hand, by the reverse tendency of the counting mechanism. The differential gear consists of a pair of spur-wheels intermeshing internally in the same plane, one of which is guided on an eccentric crank pin during the rotation of the coin-receiver, and has outer teeth engaging with the other internally toothed gear wheel, which latter is journalled centrally to the axis of the coin receiver, and is driven by the counting mechanism—thus causing the first-mentioned differential wheel to advance in a differential ratio and to operate the valve-controlling disc accordingly.

Intermittent Gas Lighting Burner.

SOCIÉTÉ CLERC-BIDAULT ET CIE., of Paris.

No. 4895; Feb. 27, 1909. Date claimed under International Convention, Sept. 19, 1908.

This apparatus for intermittent automatic illumination by means of gas-burners consists (as shown) of a movable obturating member—a sphere of magnetic metal—arranged inside the gas-conduit and subjected to the attraction of a magnet hinged outside the conduit and connected to a diaphragm forming a wall of a gas-chamber in communication with the part of the conduit comprised between the obturator and the utilization devices, with the object of opening and closing the conduit intermittently.



Intermittent Gas-Flash Lighter.

The apparatus operates as follows: The membrane J being deflated, the rod I will be depressed; and under the influence of the weights H, the magnet E will have rocked around the hinge F and will contact with the wall of the cylindrical chamber. The steel ball B is thus attracted towards the magnet, and adheres to the inner wall of the chamber, but will not block the orifices C and D. The orifice A being uncovered, gas will enter the cylindrical chamber freely, and thus reach the burners, which will be fully kindled. At the same time, however, a certain quantity of gas will pass through the orifice D and the passage L beneath the membrane, and inflate it. The rod I will then rise, and the magnet will rock around the hinge F and assume the position shown. Its action will no longer be exerted upon the ball, which will again fall into its normal position and prevent gas passing to the burners. As the pressure diminishes in the cylindrical chamber, the membrane will empty, and the gas contained in it will flow towards the burners and help to maintain them kindled as pilot lights. This collapse of the membrane is assisted by the pressure exerted upon its upper face by the weights.

When all the gas contained in the membrane has flowed towards the burners, the magnet again contacts with the cylindrical chamber, and the ball will be attracted from its seat. The previous operation will

then be repeated, and the periodical kindling and extinction of the burners will take place automatically and uniformly.

By means of a pin valve M, it is possible to regulate the duration of the kindled and extinguished phases at will by obturating the orifice for admitting gas beneath the membrane and discharging it therefrom to a greater or less extent.

The variations of pressure in the town supply mains will not exert any prejudicial effect upon the operation of the apparatus. The sole effect will be to produce the variation in the duration of the kindled phase within small limits, seeing that the weight H may be selected to permit the membrane ascending with the smallest possible pressure.

Attaching Incandescent Mantles to Mantle-Rings.

SKRIWAN, E., of Vienna.

No. 6963; March 23, 1909. Date claimed under International Convention, March 28, 1908.

This process for enabling the attachment of incandescent mantles to mantle-rings to be effected more rapidly and simply, and at the same time much more exactly, consists in that, by means of a mandrel, the mantle to be attached is shaped in and over a hollow body; the edge of the mantle overhanging the latter being fixed by needles. A string or cord passed through the edge of the mantle is then laid round the needle ends, and tightened; and the overhanging edge of the mantle is folded over the loop of the cord or string inwards, and after the mantle-ring is placed into the opening of the mantle the needles are put out of action and the loop tied.

APPLICATIONS FOR LETTERS PATENT.

16,716.—ASHFORD, A. G., and WILLIAMS, A. J., "Gas-engine." July 17.

16,746.—RHODES, J., JONES, W., and GARNETT, W., "Gas-burners." July 19.

16,766.—DODD, F. W., "Gas-engines." July 19.

16,768.—JOHNSON, G. E., "Gas-fittings." July 19.

16,778.—HÖFFLER, K., "Opening and closing apparatus for gas-pipes." July 19.

16,858.—LIDDLE, J., "Safety gas-cock." A communication from the Hasty Manufacturing Company. July 20.

16,871.—MAY, T., "Gas-purifiers." July 20.

16,890.—HAMMER, M., "Portable geyser." July 20.

16,897.—CRICK, E. H., "Regulators for gases." July 20.

16,925.—GIBBONS, W. P., and MASTERS, J. R., "Vertical retorts." July 20.

16,932.—SÄMANN, L., "Gas-regulator." July 20.

16,952.—ANDERSON, D., "Controlling devices for lighting systems." July 20.

16,956.—EGERTON, H. W., "Air-gas generator." July 21.

16,998.—BLOCK LIGHT COMPANY and WEBBER, J., "Incandescent burners." July 21.

17,011.—JOHNSON, W. C., "Improvements in means for producing a light." July 21.

17,074.—LYMN, A. H., "Production of gas and ammonia from peat and like fuels." July 22.

17,082.—HUNT, W., "Exhauster or compressor for gases." July 22.

17,112.—GIBBONS, W. P., and MASTERS, J. R., "Vertical retorts." July 22.

17,158.—LYNES, W., "Gas-fittings." July 23.

17,166.—SMITH, H. P., "Pipe-joints." July 23.

17,194.—WOLF, O., BAMBURY, N. F., and BERNARDY, E., "Incandescent gas-lamps." July 23.

17,195.—WOLF, O., BAMBURY, N. F., and BERNARDY, E., "Supplying gas for illuminating and like purposes." July 23.

17,209.—LEAVER, E. T., "Solidifying tar." July 23.

17,219.—TULLY, C. B., "Incandescent gas-lamps." July 23.

17,227.—SCHMID, C., "Fittings for gas and other pipes." July 24.

RESTORATION OF PATENT.

Notice is given that an order was made on July 22, restoring the patent granted to JAMES MALLOL for "Improvements in incandescent gas-burners," No. 19,776 of 1900, dated Nov. 3, 1900.

Brighouse Gas Undertaking.—At the meeting of the Brighouse Town Council last Wednesday, the Chairman of the Gas Committee (Alderman Healey) made a statement with regard to the gas-works which have recently come under the management of Mr. Harold Davies. In the course of his remarks, he said the Committee had accepted tenders for the coal required during the coming year; and he was glad to be in a position to inform the Council that they had been able to contract for 12,000 tons at prices which averaged about 1s. 0½d. per ton less than was paid last year. Unfortunately, their old contracts had still a few months to run; so that the Corporation would not receive the benefit of the new and reduced prices until about half of the present financial year had passed.

Death from Gas Poisoning.—At the Liverpool City Coroner's Court a few days ago, Mr. T. E. Sampson held an inquiry concerning the death of Thomas Sansbury, aged 70, a master mariner of Douglas, Isle of Man. Deceased took apartments at a temperance hotel in Liverpool, and at night was shown to his room. He had been drinking, but was not drunk. Next morning an assistant at the hotel detected a smell of gas. She found the deceased's door closed, and locked on the inside. After knocking several times, calling to him and getting no answer, she had the door forced open. On entering the room, she found it full of gas, and heard the gas escaping; the tap being turned on to its full extent. The deceased was lying on his back dead. A medical man was summoned, and he said life had been extinct for about six hours. There was only one window in the room, which was small, and it was fastened; while the fireplace was practically hermetically sealed. Evidence was given that some of the brackets and taps about the house were defective; and the Coroner called attention to this. The medical evidence was to the effect that the man died from gas poisoning; and the Jury returned a verdict accordingly.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Livesey Memorial Fund.

SIR,—I received a letter this morning from the Secretary to the County Borough of Smethwick, calling my attention to the omission of the amount of ten guineas contributed to the above fund by the Smethwick Corporation.

I find the omission occurred owing to an oversight here, and should be much obliged if you would state in your next issue that the list of subscriptions from Corporations (p. 257) should have included £10 10s. from the Smethwick Corporation Gas Committee.

39, *Victoria Street, S.W., July* 29, 1909. W. T. DUNN.

The German Experiments with "Flicker" Photometers.

SIR,—I observe in a short account of "Photometric Testing at the Reichsanstalt in 1908," on p. 258 of your issue of July 27, the outline of some experiments made with "Flicker" photometers.

It is stated firstly that the "Flicker" photometer in testing lights of different colours presents no advanage over the ordinary methods of comparison by balance or contrast photometers, and secondly that the "Flicker" photometer is not independent of the colour sense.

Now, Sir, with respect to the first point, it must be within the recollection of everyone connected by practice with photometry that, until Mr. Simmance and I produced the "Flicker" photometer head, there was never any certainty with respect to values of lights the colour of which is different to standards of light. The instrument was speedily adopted on all sides, and is in continued and increasing use; so much so that I think I am justified in saying that it is the standard method for these purposes. Not one, but several firms in Germany approached us for permission to make it; but for commercial reasons (not dissociated with the independence which Protection gives to German manufacturers), no business arrangement was entered into by us. Accordingly, the German makers fell back upon the old text-books, and produced Rood and Whitman arrangements under different names, while several "patents" have been applied for by makers. At the time the "Flicker" head was produced by us, no such device was in existence; and it was Dr. Bunte himself who was so struck with the advantage of it, that he introduced it in one form to the Zurich Congress, while Professor Vivian B. Lewes exhibited a modified form we constructed.

This brings me to the second point, which is that if (as I gather) the experiments now cited were made with the Whitman and Rood "photometers," I do not wonder that the learned experimentalists arrived at the conclusions they state. Mr. Simmance and I have continually hammered it into people that these arrangements are not photometers at all. They are examples of the "Flicker" phenomenon, but are not photometers; and experience and time show that it is almost impossible to make a practical and perfect "Flicker" photometer without following the rules laid down by us in our patent specification, to which rules the Rood and Whitman arrangements do not conform.

We have from time to time made and published experiments on the question of colour sense. We are absolutely certain of the soundness of our conclusions; and it is naturally open to anyone to experiment with the Simmance-Abady instrument and prove or disprove what we have stated.

I have no possible doubt either as to the soundness of the theoretical grounds upon which we base our contention, nor of the accuracy of the experiments that we and others have made in proof of it. I have time after time taken a colour-blind person to a photometer bench, and he has made independent readings of different coloured lights which have absolutely coincided with my own and other people's readings.

It should be clearly understood, with reference to the advantage of the "Flicker" head, that it is, of course, possible for an experienced and unbiassed photometrician to use a contrast head with differently coloured lights of low power; but as Professor Lewes, when claiming this power himself, cast doubt on the possibility of any of his audience (some 200 or 300 men, all with a good knowledge of photometry) performing the same feat, so do we claim that the use of the "Flicker" head is essential with high-power lights, and in all cases renders results certain, however inexperienced the observer.

Westminster Palace Gardens, S.W., July 29, 1909. JACQUES ABADY.

"Electricity for Everybody."

SIR,—My attention has been called to the review in your issue of the 27th inst., upon my book bearing the above title; and I am sorry you should think it likely to have such a deleterious effect on the gas industry as to make it necessary for you to occupy no less than three columns of your valuable space in an attempt to discredit it. As, however, practically the whole of your criticisms apply to only 14 pages out of the 325 pages, I am encouraged to hope that you consider the remaining 311 pages are occupied with the "many useful features" that you refer to.

Coming to details, may I say that your comment on the system suggested for estimating consumption is "a fair sample of the looseness, the inaccuracy, the ignorance, or the wilful misrepresentation (I do not know which it is) that is found throughout?" I did not state that an 8-candle power lamp would consume so many units per annum, but that the "average" consumption of all the 8-candle power equivalent lamps in the building would be found to work out at something near the figures given (which are the result of actual experience). There are many lamps—in upstairs rooms and passages, cellars, lavatories, &c.—only occasionally used, consuming far less than the average, while other lamps use far more. Your method of argument would imply that because it is known that "The Times" has a circulation of so

many thousands, therefore the "JOURNAL OF GAS LIGHTING" and every other paper has the same.

As to the dirty ceilings and the "tortious" effects of burning gas (even with incandescent burners), I must leave the next housewife you meet to tell you; and from the same source you may learn that only a few incandescent burners are used in the average house, the remainder being the old flat-flame ones.

I will not express the opinion that your review is "guilty of fabrication and omission," but will venture to say that those who read in their proper context the extracts you give, will have a very different impression of their import.

In conclusion, I would emphasize the fact that the book is not a philippic against gas, which is only referred to in a few pages, but its object is rather to provide useful information about electricity for everybody in home, or shop, or factory. If my view of the future of electricity is too roseate, it is, at any rate, not discouraged by the statement on the same page of your "JOURNAL" that the electricity supply companies in the United States now number about three to every one of the gas companies.

I shall be obliged if you will publish this letter, in order that any wrong impression received by your readers may be removed.

Kingsway, W.C., July 29, 1909. R. BORLASE MATTHEWS.

[Our correspondent is quite right. We could not afford more than three columns for the misstatements in his book in regard to gas, though there was a strong desire to write more. As to his reference to the electricity supply companies in the United States numbering about three to one of the gas companies, that is nothing novel. In London, the electricity undertakings number about ten to one gas undertaking. We refer readers to our criticism of Mr. Matthews' book last week for the answer to the remainder of his letter.—ED. J.G.L.]

Retort-House Work.—Light v. Heavy Charges.

SIR,—I have delayed referring to the letter of Mr. Charles Carpenter published in your issue of the 13th inst., in the hope that someone else might have been disposed to give his experience on the subject.

Mr. Carpenter's experience is on such an extensive scale that his views will be of immense interest to your readers. His results are, of course, unquestionable, though it is gratifying to find that until recently he held the opinion that light charges and rapid changes were the correct thing for gas-making purposes. That the results of my experiments were not in accordance with the more modern view, may possibly have been due to variations in the quality of the coal, temperature of carbonization, and other matters.

With reference to the excellent paper read by Mr. J. Ferguson Bell at the recent meeting of the Institution of Gas Engineers, I may say that my letter was not intended as a criticism. In my opinion, the paper was one of the most important and practical ever submitted to the members. The painstaking and careful work involved in obtaining and recording all the information must have been enormous.

My object was to elicit some further information on the subject of retort charges; and this has been accomplished through the courtesy of Mr. Carpenter, whose letter also furnishes a reply to that from Mr. J. G. Tooms, published in the same issue.

Huddersfield, July 23, 1909. EDWARD A. HARMAN.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons, read the first time, and referred to the Examiners: Heywood Corporation Bill.

Bill reported, preamble not proved: Glamorgan Water Board Bill.

Bills reported, with amendments: Gaslight and Coke Company Bill, Mountain Ash Urban District Council Bill, Northallerton Water Bill, Oldham Corporation Bill.

Bill read the third time and passed: Blackwood Gas Bill.

The Lord Chancellor informed the House on Thursday that the promoters of the Salford Corporation Bill did not intend to proceed further with it. An order was made accordingly.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill read a second time and committed: Gas and Water Orders Confirmation Bill [Lords].

Bill read the third time and passed: Heywood Corporation Bill.

The Risca Urban District Council Bill [Lords] has been referred to a Select Committee, consisting of Mr. Arthur Stanley (Chairman), Mr. G. D. Faber, Mr. G. H. Morgan, and Mr. G. Hardy; to meet on Friday.

Huddersfield and the Longwood Gas-Works.—At the monthly meeting of the Huddersfield County Borough Council, Mr. Cartwright referred to a minute to the effect that no further steps be taken in the matter of the purchase of the undertaking of the Longwood Gas Company. He asked what the nature of the negotiations were, and if any offer had been made by the Company or the Corporation. He would not press for anything to be divulged which ought not to be made public; but he thought that the ratepayers of Longwood had a right to know how the matter stood. Alderman Jessop said they had been making an effort to remove the injustice from which the Longwood gas consumers had been suffering, and had endeavoured to get gas for them at the same price as was paid in the borough. The resolution did not say that no further attempt would be made.

LEGAL INTELLIGENCE.

Water Rate for Unoccupied Premises.

At the Westminster County Court, last Thursday, the Metropolitan Water Board sued Mr. J. H. Montague, a surgical instrument maker, of New Bond Street, W., for £29 17s. 6d. for four quarters' water-rate. Mr. Desmond Collins, solicitor, who appeared for the Board, having formally proved the amount due, defendant said the original claim, made on a final notice, with a threat to cut the water off, in February, was for £37 7s.; but he refused to pay. Then, when a summons was issued, the amount was reduced, without a word of explanation, to £29 17s. 6d. He had paid into Court £28 7s. 9d., and contended that this was all he was liable for. Under the Board's Act of 1907, it was laid down that where no inhabited house duty was paid there must be a minimum rebate of 20 per cent. and a maximum rebate of 30 per cent. The premises in question were unoccupied for twelve months, and water was not used. At first 5 per cent. was allowed, and a threat made to cut off the water; but he defied the Board. Then they sued him, allowing 20 per cent. rebate; and he paid in an amount based on 30 per cent.—maintaining that it was the duty of the Board, in an exceptional case like this, to allow the maximum rebate. Mr. C. R. Cuff (Senior Registrar) said the Board had the right under their Act to decide what rebate they would allow. Defendant said it was most iniquitous. Mr. Cuff replied that he could not deal with this; and he ordered payment of the amount in a fortnight.

Charge for Water and Meters at Portishead.

The Magistrates at the Long Ashton Petty Sessions were recently engaged in hearing a case which came before them on a summons based on an information laid on behalf of the Portishead District Water Company for adjudication upon certain disagreements which had arisen between them and the Urban District Council as to the rates, quantities, terms, and conditions upon which water was to be supplied to them for the purposes mentioned in section 37 of the Water-Works Clauses Act, 1847—viz., for cleansing sewers, drains, &c., and for other public purposes. The questions submitted for the decision of the Bench were: (1) The charges to be made by the Company to the Council for meter-rent. (2) The rate per 1000 gallons to be paid by the Council to the Company for water supplied for the purposes mentioned in section 37 of the Act of 1847. (3) Whether the Company are entitled to charge the Council a quarterly minimum; if so, to fix the amount. The Bench decided that the Council should pay 3s. 6d. per quarter for a ¾-inch meter on each of the Council's supplies; that the charge for water for public purposes might be at the rate of 1s. per 1000 gallons; and that the Company were not entitled to charge the Council a quarterly minimum amount in respect of water supplied for public purposes. It was further decided that the costs of the Court were to be paid by the Company and the Council in moities; otherwise the parties were to bear their own costs. Leave was given to appeal.

Laindon and District Gaslight, Water, and Coke Company, Limited.—On Thursday last, Mr. Justice Eve made an order, on behalf of a debenture-holder in this Company, appointing Mr. Barber, of Old Jewry, receiver and manager. Mr. MacSwinney, who appeared for the plaintiff, said the debenture issue amounted to £4770, and the principal money was now due. Counsel for the Company consented to the order, which gave the receiver liberty to act at once, but not as manager after Oct. 31, without leave of the Court.

Thefts from Prepayment Gas-Meters by a Boy.—A boy of 15, named John Delvard, was recently before the Bolton Magistrates charged with stealing money from prepayment gas-meters. The meters in six cottages in one street were found to have been broken open, and the money abstracted. Suspicion fell on Delvard, and when he was arrested at a local theatre his pockets were found to be full of coppers. On being charged, he pleaded guilty, and was sent to an industrial school for a period of three years; the father being ordered to contribute 1s. weekly towards his support.

Dispute as to the Registration of a Meter.—A discussion with respect to the working of gas-meters took place last Wednesday at the Isle of Wight County Court, where his Honour Judge Gye was asked by the Freshwater Gas Company to give judgment in an action brought by them for £2 6s. 3d. against a customer named Fleming, for gas supplied. The defendant alleged that the meter was wrong; but evidence was called as to the periodical readings of the meter. His Honour held that there were such discrepancies between the quantities of gas alleged to have been consumed and recorded, that he could not give judgment for the plaintiffs. Mr. Parker, on behalf of the Company, applied that a case might be stated for argument in a Superior Court; but this was refused, as there was no point of law involved.

Acetylene Explosion in a Mine.—Mr. Justice Walton delivered judgment in the King's Bench Division of the High Court of Justice last Thursday in the case of *Quinn v. Ullcoats Mining Company*, which was tried before him and a Jury at the recent Carlisle Assizes. The action was brought by Mrs. Agnes Quinn, on behalf of herself and her four children, to recover damages for the loss of her husband, who was killed by an explosion of acetylene gas at defendants' iron ore mine at Egremont, in December, 1907. There was a strike at the mine, which was closed down, and became flooded, with the result that an acetylene gas-generator was submerged. In the following April the water was pumped out and the mine reopened. Plaintiff's husband and three other men were instructed to clean the generator, and in doing so they used naked candles. The water in the tank of the generator had become saturated with the gas, and an explosion occurred by which the plaintiff's husband was killed. The Jury found that defendants were guilty of negligence in not seeing that safety lamps were provided, and assessed the damages at £530. His Lordship decided that the plaintiff was entitled to this amount; and he entered judgment accordingly, with costs.

MISCELLANEOUS NEWS.

THE SUCCESS OF CO-PARTNERSHIP.

South Metropolitan and South Suburban Companies' Schemes.

Once more, last Thursday, was the Crystal Palace the scene of one of those remarkable gatherings which have for some time been an annual feature in the life-history of co-partnership. That is to say, a number of the employees of the South Metropolitan and South Suburban Gas Companies, with their wives, were invited by the Directors to celebrate the continued successful operation of the scheme. Though the great pioneer in this momentous reform for the bettering of the condition of the gas-works employees—and others—has passed away, this pleasant yearly gathering which he originated is, we are glad to see, to continue, in accordance with what it is felt would have been his wish. Thursday's proceedings began with dinner in Lyons's Restaurant; and by a different arrangement of the tables it was on this occasion found possible to provide seating accommodation for some forty more people than in previous years. In all, between 450 and 460 sat down; and, as usual, a most enjoyable time was spent. After dinner, there followed speeches, to the point, and full of enthusiasm for the system which has been so great a success—full also of affectionate and grateful references to Sir George Livesey, whose loss his many friends will never cease to deplore. Mr. Charles Carpenter, the new Chairman of the South Metropolitan Company, presided; and he was supported by Mr. Charles Hunt, who is now at the head of the South Suburban Company, and numerous Directors of both undertakings, the principal officials of which were also present.

The Loyal Toast having been honoured, Mr. Carpenter remarked that it did not seem possible that a year had elapsed since their last Co-Partnership Dinner; and he did not think that any of those who were present twelve months ago could have imagined for a moment that the next dinner would be held without the presence of him who did so much to put co-partnership on a sound and an enduring basis. They could not do better, he thought, on the present occasion than show their respect for the great and good man to whom they all owed something, and many of them much, by drinking to his memory. He would ask them, therefore, to rise in their places, and silently drink to the memory of their true friend and great co-partner, Sir George Livesey. Everyone in the room immediately responded to the suggestion; and to those present the scene was a most impressive one.

On again rising, Mr. Carpenter remarked that there was one other toast upon the list—that of "Co-Partnership"—and he was going to call upon Mr. Hunt to propose it. Mr. Hunt had been introduced to them in the past on more than one occasion by Sir George Livesey; and he need now only remind them that Mr. Hunt had taken Sir George's place as Chairman of the South Suburban Gas Company. Those who knew him were aware how thoroughly his sympathies were in accord with the principles of co-partnership; and he was sure they could not have a better advocate than Mr. Hunt.

Thus called upon, Mr. Charles Hunt proposed "Success to Co-Partnership," and said it was now exactly seven years since Sir George Livesey honoured him by an invitation to join the Board of the South Suburban Company—then the Crystal Palace Gas Company. He had thus had an opportunity of observing the inner working of the co-partnership system; and having served this full term of apprenticeship, as it were, he was able to state that, though he had not found, nor had he expected to find, perfection, yet every year of added experience had strengthened his conviction that co-partnership was an ideal means of uniting the interests of Capital and Labour, and had increased his admiration for the prescience of him who was the founder of it. What did the employer gain in return for the bonus which was given over and above the current rate of wages? The answer was that he got loyal and willing, and in some cases devoted, service; and this was worth any system of profit-sharing. Now, what did the wage-earner obtain? Some ill-disposed people had said that co-partnership was a system of driving and sweating. He only wished that these persons could have been present to-day, to look about them at the happy faces surrounding the tables; for he was sure that they would then be dispossessed, once and for ever, of this idea. What did co-partnership really do for the wage-earner? For many of them, at least, it meant practical emancipation from a hand-to-mouth existence, and the prospect of enjoying at some future time what a famous countryman of their friend Mr. Ross had called "the glorious privilege of being independent." There were no doubt some who had at first looked somewhat askance at a system under which they were not permitted to finger more than one-half of the bonus allotted to them; but these had long ago fallen into line with the rest, and the figures showed, he was glad to say, that nearly, if not quite, all the bonus was now invested year by year. He was not, of course, able to do more than to refer to the figures relating to the South Suburban Company; but these showed that since the establishment of co-partnership in 1893 or 1894, no less a sum than upwards of £33,000 had been distributed up to the end of the last financial year. They also showed that the present investments in stock and on deposit amounted to upwards of £34,000. There were now 36 co-partners who held more than £100 of stock; while the average holding per co-partner was £50. Figures like these surely meant that many a home had been made brighter by the knowledge that something was being laid aside for a rainy day, or for the time when work had to cease. And could they wonder that Directors rejoiced, when they saw, year by year, these investments increasing, and when they were able to announce an increase in the rate of bonus? It did them all good occasionally to take stock of progress; and gatherings like the present afforded an excellent opportunity of doing so. Moreover, the social intercourse which they promoted, and to which the presence of ladies, whom they were very glad to see there, contributed so largely, was a realization of that good-fellowship which it was desirable should subsist among those who were pursuing the same aims and the same objects. He hoped at some future time it might be possible to enlarge this gathering so as to make it representative of all the companies in and around London who had adopted co-partnership. That would indeed be a notable gathering, because, as they were fully aware, co-partnership was now the rule among these Companies, instead of the exception. The South Metropolitan and South Suburban Companies stood, however, in a somewhat different position from the others, inasmuch as they were the only two who had put what Sir George Livesey termed the top-stone to the edifice of co-partnership—they were the only two Companies who had combined with the system of co-partnership that of employees' Directors. It was to be hoped that their example would in course of time be followed by others, because one of the principal objects of the employees' Director was to put the respective Boards in touch with all classes of the employees, so as to create between them mutual sympathy and confidence. He was glad to say that this object had been wholly attained by the excellent selections that had been made from time to time by the co-partners, and which formed the best possible security for the permanence of the system. He would like to say one word more. Among the many honourable traditions associated with Sir George Livesey's long and successful leadership was that of supplying gas cheap. They were anxious to maintain this tradition; but it was becoming increasingly difficult to reduce prices owing chiefly to a falling off in the increase of business. They were endeavouring to overcome this; and their friend Mr. Waller had suggested that every co-partner should become a co-operator to this end. The idea seemed to be an excellent one, because there could be very few, if any, co-partners who could not do something to extend the use of gas among their friends and neighbours. They had to remember that in this, as in all other matters of the kind, the interests of the Companies were those of the employees—both as shareholders and as co-partners—and that they were pledged to promote those interests. It was the "call of the blood," so to speak, to every true co-partner; and so long as this call was answered, so long would co-partnership flourish and their undertakings prosper.

The Deputy-Chairman of the South Metropolitan Company, Mr. J. Ewart, remarked that their thoughts naturally reverted that day to the great loss that the two Companies had sustained during the past year. Among all the Directors of the South Metropolitan Company, if anyone had been asked to select the one whose life promised to be the longest, he thought the choice would have fallen upon the Chairman, though he was, of course, at that time rather tired and worn, as he had been, as was his custom, getting through very arduous work in connection with the important positions to which he had been called, and which he had occupied so admirably. Shakspeare had said: "The evil that men do lives after them, the good is oft interred with their bones." There was doubtless a large amount of truth in this; but it certainly did not apply to Sir George Livesey. If they sought everywhere, they would find no evil; while they had only to look round the tables at the contented, happy, and prosperous faces to see a part of the good that had lived after him. It was also satisfactory to know that their example was being followed in so many directions. Within the last year, a considerable number of undertakings, both large and small, had adopted co-partnership principles; and he was sure they would never live to regret it. A meeting took place the other day of one company who put a scheme into operation in the past year; and the report of the proceedings was certainly interesting. He referred to Messrs. Furness, Withy, and Co.—one of the first shipbuilding concerns to adopt the principle; and the meeting was the first held since its adoption. The Chairman, while regretting the smallness of the dividend, which was 5 per cent.—the South Metropolitan Company were satisfied at present with 5½ per cent., so he did not know why there should have been this regret—said he considered their ability to pay a dividend at all was as good a proof of stability as could in reason be desired. He then went on to say that, in regard to the inauguration of the Company's co-partnership scheme, his simple aim had been to secure that all the enterprise and capital and labour brought together should be directed to one end—the highest possible productivity under fair conditions, free from the waste friction entailed, and by which all must suffer. These results, and more, had been achieved in the South Metropolitan Company by co-partnership, for by it they had all been knit together in fellowship and goodwill—each doing his best for the prosperity of the Company.

Next came a Workman-Director of the South Metropolitan Company, Mr. Henry Austin, who expressed his pleasure at hearing Mr. Hunt's testimony in favour of the Workman-Director. As to co-partnership, it had fed and clothed him, and others as well. Long would the name be remembered and cherished of him who had contributed so much to make life pleasant and enjoyable, by raising them to the condition that Mr. Hunt had spoken of. He was exceedingly pleased with what Mr. Hunt had said about the actual stock and deposits of the South Suburban men being £1000 more than they had received by way of bonuses. The South Metropolitan employees had set the example by showing what they could do. They had no difficulty in getting co-partners to take up stock; their trouble often was in finding sufficient stock to meet requirements. There was no standard by which to measure the value he placed on co-partnership.

The South Suburban Company were next represented by Sir Fortescue Flannery, a member of the Board, who said he had now been associated with co-partnership for about eight years—relying upon one strong character, one friend whom he regarded (as everyone who knew him regarded him) as a leader, as a guide, and as a man to be followed as well as loved. Now, for the first time in the history of co-partnership that presence was removed from them, that voice was silent, that kindly face was no longer seen. When the Board of his Company had to consider recently whether or not this dinner should be continued, one of the first questions they all asked themselves was, What would he have wished? As they had always been absolutely guided by his opinion and his judgment while he was alive, they felt they could not do better than be guided by what they believed would have been his opinion had he been still with them. They all felt he would have said that the men and women who had benefited by his great social, and as they believed enduring, reform should meet together after his death in friendly intercourse, just as they did during his lifetime. They had carried out this idea, in the confident assurance that they were going forward in the same direction in which he had led them, and that they would continue to go forward for many years—indeed for the whole of their lives. He

did not limit the progress of this great movement to the lifetime even of the present generation. He had ventured to say at other gatherings of this kind that the needed social reform of this age had begun in co-partnership, and that he did not think there could ever be a solution of the difficulties between Capital and Labour except the one which was established by Sir George Livesey. They were there that day not merely for a social purpose. They were assisting to carry forward this great movement which, as he believed, would harmonize the contending claims of Capital and Labour, of employer and employed, and which would do much towards destroying the movement that was going on at the present time in favour of setting class against class. They felt confident that prosperity throughout the country must be the prosperity of all, and not of one class or one kind of the people, whoever they might be. So he repeated, as the Chairman of the South Suburban Company had already repeated, that they in Lower Sydenham were just as confident to-day as they were before—and the same, he knew, applied to the South Metropolitan Company—and it was in this confidence of doing something for the generation in which they lived, helping to leave the world a little better than they found it, that they had met now, and would look forward to future meetings. Not for a moment would they forget the memory of him who was the foundation of this movement. His name would ever be revered by them; and his personality would ever be cherished in loving and affectionate remembrance.

Mr. W. G. Waller, a Workman-Director of the South Suburban Company, expressed his great gratitude for all that co-partnership had done, and said he was sure the employees would do all in their power to make the scheme successful. It had been very gratifying during recent months to see so many gas companies adopt co-partnership; and it was to be regretted that the colliery proprietors had not gone in for the same thing. He need not say how deeply they all felt the loss of their friend Sir George Livesey. That was clearly illustrated on Oct. 10 last. He was sure the South Suburban employees would perpetuate his memory by erecting a memorial to his memory; and he pledged them to continue to go in the right direction, as they had done in the past.

Mr. F. Seage, of the Old Kent Road works, proposed a hearty vote of thanks to Mr. Carpenter and the Directors of the two Companies for their kindness in inviting them to the dinner, and remarked that he hoped the time was very far distant when these gatherings would cease. Though they deplored the loss of their late Chairman, in Mr. Carpenter they had a gentleman they could thoroughly trust. They always felt that they could go to him and obtain justice; and they ought all to feel proud of him. Mr. Waller had referred to the companies who had adopted co-partnership within the past twelve months. He had noticed in connection with one of the big London Companies that, in the course of the discussion preceding the adoption of the system, one gentleman who opposed it said it would require a microscope to find the benefit which it had done the workmen in the companies who had adopted co-partnership. Well, he thought if this gentleman had been present that day he would tell a different tale. He would not need spectacles to see the benefit it had done them.

Mr. Middleton, who spoke to the proposal, remarked that such occasions as these brought masters and men into closer relationship with one another.

The motion was also supported by a South Suburban employee, and carried with applause.

In thanking those present, on behalf of the Directors of both Companies, for the vote, Mr. Carpenter remarked that it would be matter for great regret if anything happened to prevent the continuity of these dinners; but he did not for a single moment imagine that anything would happen. They were, however, all sure that, dinners or no dinners, co-partnership was established on such a firm and solid foundation that nothing except progress could be the future of it. The amount of the holding of the South Suburban employees had been mentioned. Of course, the South Metropolitan Company was larger, and the scheme had been in operation longer. Their employees' holding was £419,000, which included what he might call the property held by them, not only in stock, but also in houses which they had bought through the Building Society, but out of what they might call co-partnership profits. So that adding the two Companies' amounts together, they were getting on towards half-a-million of money. If this was not a satisfactory result after twenty years of co-partnership, he would like to know what would be.

The Secretary of the South Metropolitan Company, Mr. F. M'Leod, said there was no doubt some people thought they were possessed by the one idea of co-partnership; but while they might hold to the idea very strongly, it did not follow it was the only thing which interested them. It was peculiarly true of the employees of the two Companies represented there that day, that there was nothing worth doing which they were not taking some active part in. They sent a good contingent to the South African war; they had a strong body of territorials; and many of the men were efficient members of the ambulance corps. Thus co-partnership, besides winning wealth, turned out good citizens. This was to the credit of the system, because, after all, the accumulation of money was not the only, and probably not the primary, advantage. There were certain other advantages of a moral character which turned out good Englishmen. Some of their men went to the Colonies; and he thought a good co-partner would make a good Colonist, so they were helping to extend the Empire with the proper sort of stuff. They all remembered Sir George Livesey presiding at the dinners on past occasions; and they would never forget his presence and his beneficence. But they had to bear in mind that they lived for the future; and they could best honour the dead by doing what they knew would be his wish if he were still with them. They had in Mr. Carpenter a worthy successor in every respect—a leader of whom they should be proud. He pledged them all that in future they would be as loyal to Mr. Carpenter as they were to his predecessor; and if they went on in this spirit, they would hand down to those who followed them a heritage of which they would be proud, and which would be as beneficial to their successors as they themselves had found it.

Mr. S. Y. Shoubridge, the Engineer of the South Suburban Company, said they were all grateful to the Directors for their kindness and generosity in inviting them there to meet their friends of the South Metropolitan Company and to enjoy such a bountiful repast. They missed the gracious presence and the familiar voice of the "founder of the feast," who was never so happy as when presiding over these gatherings; but they felt quite sure, by the continuance of these festivals, that his spirit had descended upon those who were following him in the conduct of these two great undertakings. Sir George Livesey would rejoice could he see that the good work he inaugurated was being carried on so prosperously by Mr. Carpenter and Mr. Hunt (into whose hands the direction of the two South London Companies had fallen since Sir George's death). They were all determined, as far as they could, to help these gentlemen, not only to maintain co-partnership on its present high level, but to advance it to the very highest point of efficiency which it was capable of attaining. In this way only could they show their real regard for the memory of the great man who was their benefactor and their friend.

Mr. Charles M. Ohren, the South Suburban Secretary, also spoke a few words of thanks.

The company then rose from the tables and betook themselves to the grounds; returning to the restaurant again later on for tea.

ELECTRIC STREET LIGHTING IN MAIDSTONE.

Reply to the Gas Company's Protest.

Some weeks ago, Mr. George Marsham, the Chairman of the Maidstone Gas Company, addressed a letter to the Mayor, protesting against a proposal to convert 158 of the public gas-lamps to electricity; and to this the Committee have now replied.

Mr. Marsham, in the course of his letter, said the proposal appeared to be an unnecessary step viewed from the standpoint of efficiency, and a costly one viewed from the standpoint of economy. Comparison between the double Osram lamps and the ordinary gas-lamps in the immediate neighbourhood showed that the gas-lamps were at least equal in efficiency; and the proposed new single Osram lamps would be of less illuminating power than the existing gas-lamps. In regard to the cost, the revenue to be derived by the electricity undertaking from these 158 public lamps was computed by the Electrical Engineer at £474 per annum (at £3 per lamp), as compared with £485 17s. (or £3 1s. 6d. per lamp), which had been the price charged by the Gas Company for many years past. In the figure of £474, only 1¼d. per unit was allowed for the current consumed; and this price was about ½d. below actual cost price, as analysis of the borough accounts for 1908 seemed to show. In order to effect this problematical saving of £11 17s. per annum, an outlay of £2050 was to be incurred in laying cables, purchasing the standards, and converting them into electric lamps. It had been stated that the present proposal would enable the Committee to reduce the current price of 363 Nernst lamps, now charged at £3 10s. per annum, to £3 per lamp. This could not be done on a business basis; and if the Highways Committee were charged only £3 a lamp, there must be a loss to the Electricity Committee. As showing the effect of electric lighting, attention was called to the following figures: For the last two years preceding the introduction of electric lighting, the average cost of public lighting was £2338 per annum. For the year ended March 31, 1908 (as shown in the printed Maidstone Corporation accounts), the cost was £3337—an increase of almost exactly £1000 a year, or over 42 per cent. "There has," said Mr. Marsham, "certainly been no improvement in public lighting at all commensurate with this increased expense." In conclusion, the letter urged that the matter of public lighting should be treated on business lines—namely, that the Corporation, on behalf of the ratepayers, whose money they were expending, should buy their illumination for the streets of the town in the cheapest market, consistent with efficiency.

The Electricity Committee, in their reply, after remarking that there is "very little in the arguments put forth against the Corporation carrying out this electric street lighting," proceed as follows: "Before dealing with the various points raised, it would be well to state that the proposition was considered by the Committee, who are business men, purely as a business undertaking; and after careful consideration, they decided that it was to the advantage of the electrical undertaking that it should be gone on with. The lighting effect given by an Osram lamp is certainly equal to that given by a gas-mantle; and it is to the advantage of the Osram lamp that its candle power remains practically constant throughout its life, while no one will deny that the candle power of a gas-mantle falls off very considerably as the mantle gets old. The paragraph as to the cost of producing electrical energy appears to have been written by someone who is not well acquainted with the many details of the cost of production of electrical energy, and misapprehends several of the vital factors connected with the subject. The Committee have had sufficient figures before them to enable them to decide that the selling price left a fair margin over the cost of production. With regard to the increased cost of public lighting, the Gas Company's letter says nothing as to the large number of additional lamps (both gas and electric) erected in the out-lying parts of the borough since the date when the cost of gas lighting was quoted; and with regard to the extra cost of street lighting, it is certainly a matter of opinion as to what value ought to be attached to the better lighting of the main thoroughfares. On this point, the opinion of the Gas Company can hardly be taken as unbiassed. From inquiries made, there are few traders in the High Street who would care to go back to the lighting of that thoroughfare as it was before the arc lamps were put up. In conclusion, the Committee submit that the saving to the town (as distinct from the Electricity Committee) will be at least £194 17s., made up by the reduction in price of the existing lamps, and the saving of the new ones; while the profit to the Electricity Committee in obtaining the additional lamps at the price to be charged is a substantial one. It should be pointed out that the town will be paying the Electricity Committee 1s. 6d. per lamp, or a total of £39 6s., less than they would be paying the Gas Company for an equal number of lamps; and the Committee can vouch that at the price charged there will not be a loss to the Electricity Committee as a trading concern, but a profit."

GASLIGHT AND COKE COMPANY'S ACCOUNTS.

[For Half-Yearly Report, see p. 302.]

The accounts of the Company for the six months ended June 30, to be submitted with the Directors' report on Friday, consist of the usual statements, from which we take the following particulars.

The statement of capital (stock) sets forth that the total paid up is £9,466,500; added on conversion, £12,176,565—total amount authorized, £21,643,065. Deducting the amount redeemed, £101,655, the total amount of the Company's existing capital powers is £21,541,410. The statement of loan capital stands thus: Total paid up, £2,844,000; added on conversion, £1,479,975; unissued, £750,000—total amount authorized, £5,073,975.

The capital account shows receipts (with premiums, £1,586,807 11s. 9d.) to the amount of £27,472,192 11s. 9d. The expenditure is shown in the following items:—

Expenditure to Dec. 31, 1908		£13,508,491 5 10
Expenditure during the half year to June 30, 1909—viz.,		
Buildings and machinery in extension of works	£2,847 17 9	
New and additional mains and service-pipes	13,386 17 3	
Do. do. meters	13,680 6 1	
Do. do. stoves	15,298 0 7	
		45,213 1 8
		£13,553,704 7 6
By sale of surplus land	£1,658 18 2	
By depreciation of plant	5,391 5 8	
By depreciation of meters and stoves	40,817 13 7	
		47,867 17 5
Total expenditure		£13,505,836 10 1
Nominal amount added on conversion		13,656,540 0 0
		£27,162,376 10 1
Deduct amount of capital redeemed under Company's Act of 1903		101,655 0 0
		£27,050,721 10 1
Balance of capital account		391,471 1 8
		£27,452,192 11 9

The balance applicable to the redemption fund and to dividend on the ordinary stock is £773,195 18s. 8d.; and the following statement shows how it is proposed to appropriate it:—

June, 1908.			
£349,551	..	Net balance brought from last account	£423,323 17 11
416,434	..	Net revenue for the half year	349,872 0 9
£765,985			£773,195 18 8
10,000	..	Contribution to redemption fund	10,000 0 0
(£4 10s. 8d. p. ct.)		Dividend on the ordinary stock—	
£343,662	..	£4 13s. 4d. per cent. per annum on £15,141,545	353,302 14 4
25	..	Forfeiture for deficiency in illuminating power	..
£412,298	..	Balance carried to next account	£409,893 4 4

The following is the revenue account:—

Expenditure.

June Half Year, 1908.		£ s. d.	£ s. d.
	Manufacture of gas—		
£662,199	Coal, including all expenses thereon	583,697 2 7	
82,532	Oil ,, less value of oil tar	87,277 4 9	
37,680	Coke and breeze used in the manufacture of carburetted water gas	32,655 7 2	
15,033	Salaries of Engineers and other officers at works	15,005 8 4	
96,968	Wages	90,768 3 5	
17,054	Purification	12,319 19 3	
183,849	Repair and maintenance of works and plant, materials and labour, less received for old materials, £5336 15s. 8d.	175,127 14 8	
	Distribution of gas—		996,851 0 2
45,006	Salaries and wages of officers (including rental clerks)	46,887 16 10	
53,504	Repair and maintenance of mains and service-pipes, &c.	56,103 10 3	
52,089	Repair and renewal of meters	59,000 2 9	
48,371	,, ,, stoves	51,910 5 8	
31,045	Gas fittings, including labour (automatic meter supplies)	29,518 5 11	
			243,420 1 5
19,859	Public lamps—lighting and repairing	..	20,931 16 1
	Rents, rates, and taxes—		
5,859	Rents payable	5,913 9 0	
138,465	Rates and taxes	141,898 8 3	
	Management—		147,811 17 3
2,750	Directors' allowance	2,750 0 0	
202	Company's Auditors and Assistant	204 4 0	
8,167	Salaries of General Manager, Secretary, Accountant, and clerks	8,399 6 9	
23,018	Collectors and cashiers	22,448 17 5	
5,763	Stationery and printing	6,987 15 4	
6,437	General charges	7,914 16 8	
			48,704 19 11
..	Co-partnership for the half year	..	11,605 0 0
383	Parliamentary charges	..	1,396 13 0
1,375	Law charges	..	1,375 1 4
7,506	Bad debts	..	9,681 11 2
500	Depreciation fund for works on leasehold lands	..	500 0 0
24,714	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	24,872 8 7
2,164	Workmen's compensation account	..	1,837 18 1
	Public officers—		
1,243	Gas Referees and Official Auditor	1,243 11 6	
617	Public testing-stations	664 1 5	
			1,907 12 11
£1,574,359			1,510,895 19 11
621,783	Balance carried to net revenue account		572,600 1 3
£2,196,142			2,083,496 1 2

Receipts.

June Half Year, 1908.		£ s. d.	£ s. d.
	Sale of gas—		
	Per meter, at 2s. 9d. and 2s. 5d. per 1000 cubic feet		
£1,482,772		1,454,310 12 0	
74,878	Public lighting and under contracts	74,065 6 5	
			1,528,375 18 5
£1,557,650			
29,029	Rental of meters (ordinary)	..	28,618 5 3
41,246	Rental of stoves	..	43,676 7 10
64,360	Rental of fittings	..	71,908 15 4
	Residual products—		
£327,794	Coke, less £37,985 7s. 7d. for labour, &c.	248,811 17 2	
21,384	Breeze, less £6406 17s. 2d. ,,	16,215 5 8	
52,155	Tar and tar products	48,301 2 3	
97,630	Ammoniacal liquor and sulphate of ammonia	92,606 2 2	
			405,934 7 3
£498,963			
£4,614	Rents receivable		4,652 7 1
280	Transfer fees		330 0 0
£2,196,142			2,083,496 1 2

The three statements relating to the reserve, insurance, and depreciation funds, stood as follows on June 30: Reserve fund, £66,942; insurance fund, £115,308; depreciation fund, £70,764.

The following statements relate to the working:—

Statement of Coal Used, &c.

Description of Coal.	In Store Dec. 31, 1908.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1909.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	223,780	741,955	848,860	2,055	114,820
Cannel	5,097	..	1,015	..	4,082
Total	228,877	741,955	*849,875	2,055	118,902

* In addition to this quantity of coal, 7,723,826 gallons of oil and 111,911 gallons of spirit were used during the half year.

Statement of Residual Products.

Description.	In Store Dec. 31, 1908.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1909.
Coke—tons	21,278	536,836	116,388	410,277	31,449
Breeze—tons	1,967	82,288	12,459	70,487	1,309
Tar, from coal only—galls.	810,103	8,722,309	8,744,366	129,003	659,043
Ammoniacal liquor—butts	21,707	247,384	247,061	..	22,030

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
*12,355,543	458,760	10,788,769	11,394,201	48,972
†12,270,924	463,857	10,705,241	11,314,934	49,043

* Including 2,748,772,000 cubic feet of carburetted water gas. † June half year, 1908.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the half year as follows: Coal, £83,308; oil and petroleum spirit, £44,931; coke, £15,807; tar and ammoniacal liquor and products, £70,457; and sundries, £228,183. The figures this time last year were: Coal, £118,574; oil and petroleum spirit, £55,319; coke, £29,399; tar and ammoniacal liquor and products, £80,925; and sundries, £222,171.

SOUTH METROPOLITAN GAS COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 302.]

The following are the principal portions of the accounts of this Company for the six months ending the 30th of June.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows: Amount received, £5,328,820; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows:—

Capital account to Dec. 31, 1908			£5,041,412 19 4
Expenditure during half year to June 30, 1909, viz.—			
New and additional mains and services	£1,001 5 8		
New and additional meters	1,040 9 5		
New and additional stoves	1,210 7 0		
	£3,252 2 1		
By sale of land	120 0 0		
		3,132 2 1	
Total expenditure			£5,044,545 1 5
Balance			284,274 18 7
			£5,328,820 0 0
Nominal amount added by conversion, less premium			2,996,520 0 0
Total			£8,325,340 0 0

The following is the revenue account:—

Expenditure.

Manufacture of gas—			
Coal into store	£368,695 11 3		
Purification	9,704 4 7		
Salaries of Engineers and Officers at works	13,169 6 10		
Wages (carbonizing)	51,109 9 1		
Repairs and maintenance of works and plant, less £3623 13s. 4d. received for old materials	96,818 17 6		
		£539,097 9 3	
Co-partnership for twelve months to 30th June, 1909	£37,122 19 2		
Less on account	13,000 0 0		
		24,122 19 2	
Distribution of gas—			
Repair, maintenance, and renewal of mains and service-pipes	£25,713 14 9		
Salaries and wages of officers, including rental clerks	19,459 11 10		
Repairing and renewals of meters	26,816 17 0		
Repairing and renewals of stoves	28,980 17 1		
Repairing and renewals of gas-fittings	31,669 10 1		
		132,640 10 9	
Public lamps, including £16,717 0s. 2d. for labour and materials, less £15,800 0s. 8d. received for the same		916 19 6	
Rents, rates, and taxes—			
Rents payable	£873 14 7		
Rates and taxes	45,608 5 7		
		46,482 0 2	
Management—			
Directors' allowance	£2,837 15 0		
Salaries of Secretary, Accountant, and clerks	3,702 19 9		
Collectors { Ordinary	6,922 3 9		
Collectors { Slot meter	8,914 14 11		
Stationery and printing	3,032 0 3		
Livesey Professorship at Leeds University	2,000 0 0		
General charges	7,788 3 1		
Company's Auditors	112 10 0		
		35,310 6 9	
Law charges	£1,843 10 3		
Parliamentary charges	548 14 11		
		2,392 5 2	
Bad debts		1,904 7 9	
Stolen from 5417 slot meters broken open		576 13 6	
Pensions and officers' and workmen's superannuation, sick, and accident funds		7,344 8 8	
Gas Referees and Official Auditor		379 14 0	
Leasehold renewal fund		300 0 0	
Total expenditure		£791,467 14 8	
Balance carried to net revenue account		262,490 11 1	
		£1,053,958 5 9	

Receipts.

Sale of gas—			
Lady-Day, at 2s. 3d. per 1000 feet	£404,525 5 3		
Midsummer, at 2s. 3d. per 1000 feet	275,534 15 7		
	£680,060 0 10		
Public lighting	17,485 11 9		
		£697,545 12 7	
Meters in use (341,359)—			
Company's meters at rent: Ordinary, 97,486; slot, 235,617	£37,858 16 8		
Company's stoves at rent: Ordinary, 77,778; slot, 191,550; fires, 23,582	30,140 15 2		
		67,999 11 10	
Residual products—			
Coke, less labour and cartage	£152,706 12 3		
Breeze, less labour and cartage	4,722 2 5		
Tar and tar products, less labour	34,382 11 1		
Sulphate of ammonia	57,599 1 9		
		249,410 7 6	
Rents receivable		1,513 1 5	
Transfer fees		88 7 6	
Gas-fittings		37,401 4 11	
Total receipts		£1,053,958 5 9	

Total amount paid in salaries for half year, £35,405 9s. 2d.
" " " wages " £256,759 19s. 2d.

The net revenue account shows a sum of £238,190 3s. 2d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on June 30 were as follows: Reserve fund, £181,404; renewal fund, £29,062; insurance fund, £97,739. The amount written off the reserve fund for depreciation of investments, referred to in the Directors' report, is £10,614; off the insurance fund, £14,113.

Statement of Coal.

In Store December 31, 1908.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1909.
Tons.	Tons.	Tons.	Tons.	Tons.
114,765	596,486	570,075	791	140,385

Statement of Residual Products.

Description.	In Store Dec. 31, 1908.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1909.
Coke—cwt.	891,940	7,047,587	1,623,416	5,762,791	553,320
Breeze—yards	12,172	125,120	43,524	83,590	10,178
Tar—gallons	657,603	5,822,349	5,725,363	35,243	719,346
Ammoniacal liquor—butts	12,720	203,407	206,242	..	9,885

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	23,676 incandes't
6,406,782	167,073	6,119,663	6,363,372	11 flat flame

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £77,211; coke and breeze, £14,083; tar, sulphate, and ammoniacal liquor, £36,778; and sundries, £288,911. The figures this time last year were: Coal, £62,179; coke and breeze, £16,023; tar, sulphate, and ammoniacal liquor, £45,465; and sundries, £290,272. A sum of £45,232, workmen's bonuses and savings, has been deposited with the Company; and the total of the officers' superannuation and guarantee funds is £50,659. The figures last year were £36,359 and £47,162.

BRENTFORD GAS COMPANY.

Half-Yearly Report and Accounts.

In the report for the six months ending June 30, which the Directors will present at the ordinary meeting on Friday, they state that though the weather during a large portion of the half year was unfavourable for gas consumption, there was nevertheless an increase of 3·20 per cent. in the quantity of gas sold, and that the business generally is increasing. They report with satisfaction that the 30-inch main connecting the Southall and Brentford stations is now finished, and, together with a remodelled governor-house at Brentford, which is nearing completion, will be ready to meet and regulate the demands for gas during the ensuing winter. They say, however, that the works are still much overtaxed, and some reconstruction and the adoption of up-to-date appliances are absolutely necessary. To provide the necessary working capital, a further issue of the new stock (of 1881) in the autumn is contemplated. The Directors conclude their report with an expression of regret at the death, on the 16th of March last, of Mr. Howard Charles Ward, who had been for the long period of 58 years identified with the affairs of the Company. As already announced in the "JOURNAL," they have elected Mr. D. Milne Watson, the General Manager of the Gaslight and Coke Company, to fill the vacancy.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £185,307; from meter and stove rents, to £20,330; and from the sale of residual products, to £38,668—rents and transfer fees making up a total of £244,343, compared with £241,771 in the corresponding period of 1908. On the other hand, the manufacture of gas cost £126,326; distribution, £45,591; and management, £7888—the total expenditure being £197,976, against £200,672. The balance carried to the profit and loss account is £46,367, compared with £41,099 this time last year. The amount available for distribution is £88,959; and the Directors recommend the declaration of the usual dividends at the rates of 5, 12½, and 9½ per cent. per annum on the preference, consolidated, and new stocks respectively.

The working statements show that 86,121 tons of Newcastle coal and 1,297,380 gallons of oil were used in the production of 1,436,432,000 cubic feet of gas (including 482,691,000 cubic feet of carburetted water gas), of which 1,342,560,000 cubic feet were sold and 1,364,560,000 cubic feet were accounted for. The estimated production of residual products was: Coke, 53,646 tons; breeze, 6691 tons; tar, 1,237,259 gallons; ammoniacal liquor, 24,293 butts.

SOUTH SUBURBAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report of the Directors for the six months ending the 30th of June, which, with the accounts, will be presented at the half-yearly general meeting on Friday.

To the great regret of all his colleagues, Mr. Robert Morton declined to be re-elected as Chairman on the termination of his period of office. The Directors have placed on record their high appreciation of his valuable services during the time that he occupied the chair, and unanimously elected Mr. Charles Hunt to succeed him as Chairman.

There has been an increase in the gas sales of about 2½ per cent. This is satisfactory, having regard to the increasing use of more economical burners by consumers, and also to the keen competition which gas has now to meet. Encouragement is given to the use of the most economical methods of using gas, not only for lighting but also for heating and cooking.

The receipts for gas show a falling off of £1818, as compared with those of the corresponding half year; this being due to the reduction of price which was made last year. The returns for residuals are also less by £6268—coke, tar, and ammonia all contributing to this result. On the other hand, coal and other items of expenditure show considerable improvement, due partly to reduction of prices and partly to a notable advance in carbonizing methods. The net result is an increase of profit of £1162.

The balance of profit available for dividend, after placing £4500 to the insurance fund, is £28,407; and the Directors recommend a dividend at the rate of 5 per cent. per annum on the 5 per cent. preference stock, and at the rate of 5½ per cent. per annum on the ordinary stock—this being the full amount authorized under the sliding-scale.

A supply of coal for the ensuing twelve months has been secured at a small reduction of price; and the Directors have had the satisfaction of announcing a further reduction in the price of gas to 2s. 5d. per 1000 cubic feet, to take effect from Midsummer last. This brings the price down to the level reached before the advance in price two years ago.

Mr. Robert Wyllie, having retired from the service of the Company, has vacated his position as Employees' Director; and Mr. George Ross, foreman fitter, has been elected by the employees in his place, and has already proved himself to be a very useful Director. This participation of the employees in the responsibility of management has proved to be one of the most gratifying features of the system of co-partnership; for it contributes materially to the maintenance of the satisfactory relations which the Directors are glad to report continue to exist between them and all classes of the Company's employees.

The accounts accompanying the report show that the total capital

expenditure on the 30th of June was £802,424, or £28,869 less than the receipts, including the premium capital—£831,363 in all. The net revenue from the sale of gas was £86,227; the rental of meters and stoves produced £6453; the sale of residuals, £26,647; and a small item of rents brought up the total receipts to £119,368. The following were the principal items of expenditure: Manufacture of gas (including £46,922 for coal and £13,270 for maintenance of works and plant), £66,540; distribution, £13,178; management, £5040—rents, rates, and taxes (£4764) and miscellaneous items bringing up the total to £93,154. Among these items is a sum of £1602 charged on account of the co-partnership scheme. The balance carried to the net revenue account is £26,214; and the amount applicable for dividend is £28,407.

The statements as to working show that 62 838 tons of coal were carbonized in the half year. The quantity of gas made was 727,763,000 cubic feet, of which 702,846,000 cubic feet were sold and 711,874,000 cubic feet accounted for. The residuals were: Coke, 754,056 cwt., of which 155,366 cwt. (estimated) were used in manufacture; breeze, 19,130 yards; tar, 614,462 gallons; ammoniacal liquor, 14,196 butts—the make of sulphate of ammonia being 587 tons.

TOTTENHAM AND EDMONTON GAS COMPANY.

Half-Yearly Report and Accounts.

At the Annual Ordinary General Meeting of the Company on Saturday, the Directors will report an increase of 8·31 per cent. in the sales of gas in the six months ending the 30th of June, compared with the corresponding period of 1908. There was an addition during the twelve months of 4072 consumers, and an increase of 7927 in the number of cooking and heating stoves. The accounts accompanying the report show that £16,554 was expended on capital account in the half year; £10,102 being for new mains and service-pipes, including laying and other work connected with distribution. The sale of gas produced £88,507; the rental of meters, stoves, and fittings and the maintenance of incandescent mantles, £14,449; residuals brought in £17,968; and the total revenue was £120,962. The expenditure on the manufacture of gas was £68,246, including £33,833 for coal, £12,228 for oil and coke used in making water gas, and £14,969 for the repair and maintenance of works and plant; on distribution, £20,574; on management, £4150; and for the co-partnership scheme, £1300—the total expenses being £102,185, leaving £18,777 to be carried to the profit and loss account. The amount available for distribution, with £18,552 brought forward, is £33,649; and the Directors recommend the payment of the full statutory dividends of 6⅝ and 5⅝ per cent. per annum on the "A" and "B" stocks. This will absorb £15,057, and leave £18,592 to be carried forward. The higher dividends recommended are due to the reduction in the price of gas which took effect on Jan. 1 last.

The working statements in the account show that 41,357 tons of coal and 688,169 gallons of enriching oil were used in the production of 747,476,000 cubic feet of gas, of which 725,018,000 cubic feet were sold and 738,942,000 cubic feet accounted for. The residual products were: Coke, 24,814 tons 4 cwt., of which 6703 tons 11 cwt. were used for making coal gas, and 5366 tons 5 cwt. for producing carburetted water gas; breeze, 6172¾ chaldrons; tar, 540,433 gallons; and ammoniacal liquor, 11,488 butts. The quantity of sulphate of ammonia made in the half year was 367 tons 6 cwt. 2 qrs. 6 lbs.

Improved Incandescent Gas Lighting in Lambeth.

At the meeting of the Lambeth Borough Council last Thursday, a letter was received from the South Metropolitan Gas Company, stating that, as the result of experiments with a new inverted burner designed especially for street lighting, they were able to make a substantial reduction in the yearly charge. Hitherto this has been at the same rate as the No. 4 burner; but the Company will now, by the reduced cost of upkeep and the lower charge for gas, reduce this figure to £2 19s. 6d. As the new burner gives a light of 120 candles compared with 80 candles for the No. 4 burner, the reduction in the cost of lighting by its use will be very considerable, especially as the charge made for converting a lamp with a No. 4 burner to the inverted pattern is only 3s. By reason of the lower price of gas which came into operation at Midsummer, the charges for Nos. 2, 3, and 4 burner lamps will be reduced by 11d., 1s. 3d., and 1s. 7d. respectively; that is to say, to £2 8s. 3d., £2 15s. 6d., and £3 2s. 10d. The letter went on to suggest that, in view of the saving to be effected by replacing the No. 4 burner by the new inverted type, the Council might, in addition to converting these burners, think it desirable to make a similar change in respect of some of the No. 3 burners. Should this be done, the cost of conversion would be the same as in the case of the No. 4 burner. The Lighting Committee reported that there were at present in the Company's district 670 lamps with No. 4 burners which were not inverted, with two additional lamps which were alight day and night. The cost of converting these to the inverted pattern and fitting burners, at 3s. per lamp, would be £100 16s. But in the first complete year, even after allowing for the payment of this cost, there would be a saving of 4d. per lamp, less 5 per cent. discount; while after the first complete year there would be a saving of 3s. 4d. per lamp per annum, less 5 per cent. There were 88 lamps fitted with No. 3 burners; but as there would be an increase in the present charges if the inverted burners were fitted in these lamps, the Committee did not consider that any action should be taken with regard to same. It was resolved to accept the offer of the Company with regard to the conversion of the lamps fitted with No. 4 burners.

At a meeting of the Directors of Messrs. C. & W. Walker, Limited, held in Birmingham last Thursday, it was resolved to pay an interim dividend for the six months ended July 31 at the rate of 5¼ per cent. per annum, less income-tax, on the cumulative preference shares, and on the ordinary shares at the rate of 10 per cent. per annum, free of income-tax. These dividends are the same as those declared a year ago.

MANCHESTER CORPORATION GAS UNDERTAKING.

Annual Report and Accounts.

We have received from the Superintendent of the City of Manchester Gas Department (Mr. F. A. Price) the report and accounts of the Gas Committee for the year ending March 31; and from them the following particulars have been gathered. The report bears the signature of Alderman R. Gibson, the Chairman of the Committee.

The quantity of coal and cannel carbonized (including the equivalents of enriching materials) was 514,446 tons, compared with 527,891 tons in the previous year; the quantity of gas made per ton being 10,962 cubic feet, against 10,948 cubic feet. The residual products made per ton of coal were: Coke, 13·45 cwt.; tar, 11·41 gallons; ammoniacal liquor, 28·52 gallons. The quantity of gas sent out from the works (5,638,451,000 cubic feet) shows a decrease of 139,065,000 cubic feet, or 2·41 per cent., compared with an increase of 187,610,000 cubic feet, or 3·36 per cent., the preceding year. The quantity of carburetted water gas produced during the year was 1,125,745,000 cubic feet, compared with 1,164,117,000 cubic feet the previous year. In the production of this gas 2,541,571 gallons of oil and 24,039 tons of coke were used, against 2,709,355 gallons and 23,990 tons respectively for the year ending March 31, 1908. The illuminating power of the gas sent from the works, as tested by the "Metropolitan" No. 2 burner, was 17·72 standard sperm candles. The unaccounted-for gas was 3·24 per cent., which compares with 3·54 per cent. for the previous year.

The number of consumers on March 31 was 174,290, of whom 23,160 were outside the city. The previous year the number was 170,938, of whom 22,286 were outside the city. The total increase was thus 3352. Of the consumers, 58,041 use prepayment meters. This compares with 56,368 in the previous year—an increase of 1673; and of this increase 1371 were fixed in the city and 302 in the out-townships. The quantity of gas passed by these meters was 526,852,000 feet—an increase of 8,784,000 feet, or 1·69 per cent., on the previous year. The meters were inspected once in every five weeks; and the amount collected during the year was £74,041 9s. 10d. This is represented by 17,769,958 pennies, weighing 158 tons 13 cwt. 0 qr. 23 lbs.

The number of gas-cookers owned and fixed by the Committee at March 31 was 46,391, compared with 41,456 for the year ending March, 1908. The total quantity of gas that was consumed by cookers is estimated at 613,000,000 cubic feet—being an increase of 43,000,000 feet, or 7·54 per cent., on last year's figures. There have also been fixed 30,724 grillers in connection with prepayment and small ordinary meters. About 44 per cent. of the consumers now have the free use of a cooker or griller. On March 31 last, the number of gas-engines in use was 1733, compared with 1741 in the previous year. The quantity of gas consumed by these engines was 390,637,000 cubic feet—a decrease of 35,493,000 feet, or 8·33 per cent. The cost of coal, cannel, and oil per ton carbonized was 11s. 9·14d., against 11s. 4·17d. for the previous year—an increase of 4·97d. per ton, which, on the total carbonization of 514,446 tons, amounts to £10,653.

The total income was £761,363, against £782,690; and the expenditure £621,341, against £618,702. The gross profit on the year's working was £140,022, out of which the sum of £50,149 was paid for interest on loans, &c. The net profit therefore amounted to £89,873, compared with £116,181 in the previous year. This sum, together with £42,732 transferred from reserve—making together £132,605—has been appropriated as follows: To the sinking fund for redemptions of loans, £63,766; paid over to the city fund, £60,000; extension of carburetted water-gas plant £391; general extensions (wages), £7751; purchase of consolidated 4 per cent. stock for cancellation, £697.

During the year, the construction of 18 beds of inclined retorts in No. 2 retort-house at the Gaythorn station, forming the second section, so far progressed that they will be available for gas making during the ensuing winter. This completed retort-house is now the largest belonging to the Gas Department. It contains 36 beds of retorts, or 576 mouthpieces; and it will be capable of carbonizing 400 tons of coal and producing upwards of 4½ million cubic feet of gas per diem. The entire removal of the "C" section purifiers opened out much desirable space between the meter-house and the washing and scrubbing plant. Old workshops and stores at the Rochdale Road station were demolished, and preparation was made for the arrangement of the space for the disposal of coke in small quantities through a new entrance to the station. The No. 2 gasholder, which has been in use more than forty years, has been resheeted. Good progress was made at the Bradford Road station with the construction of the new gasholder tank; the brickwork having been completed. The gable wall of No. 1 retort-house, which had become unsafe through the expansion of the retort-bench, was rebuilt in such a manner that there will be no difficulty through this action in the future. During the year, several improvements and rearrangements were effected in the plant at the chemical works, which will conduce to further economies in the manufacture of sulphuric acid and sulphate of ammonia. The total length of mains now laid is 1,628,780 yards, or 925¼ miles and 340 yards; being an increase of 12¾ miles and 67 yards during the year. The number of public lamps within the city is 18,704, and outside the city 2349—a total of 21,053. The incandescent system of lighting has been applied to all the lamps within the city; and the number of burners fixed thereto is 25,161.

The following are the principal items in the accounts:—

REVENUE ACCOUNT.

INCOME.

Gas-rental—					
Ordinary meters				£499,876	4 5
Prepayment meters				74,041	9 10
Public lamps				41,453	15 5
Residual products—					
Coke	£87,846	3	0		
Tar	22,581	16	2		
Sulphate of ammonia	34,235	7	7		
Carbon	515	7	8		
				145,178	14 5
Rents of cottages, &c.				813	8 1
				£761,363	12 2

EXPENDITURE.

Manufacture—					
Cannel, coal, and oil (including cost of unloading, &c.)	£302,551	8	1		
Coke, water, &c. (carburetted water gas)	8,473	6	2		
Carbonization (wages)	45,217	8	0		
Purification (less sales of spent material, £6025 5s. 3d.)	471	14	0		
Retorts, fire-bricks, &c.	9,031	11	2		
Repairs and maintenance of works, &c.	42,961	13	7		
Salaries of Engineer and works staff (less proportion transferred, £1959 3s. 6d.)	6,355	10	10		
	£415,062	11	10		
Provision for renewal of works plant (less £1207 1s. 8d. charged to sulphate of ammonia)	19,739	0	0		
				£434,801	11	10
Distribution—					
Repair and maintenance of mains, services, meters, and stoves	£34,962	2	1		
Salaries (less proportion transferred, £300)	26,166	9	6		
	£61,128	11	7		
Provision for renewal of distribution plant	46,551	0	0		
				107,679	11	7
Rents, rates, and taxes				52,007	13	8
Management—					
Salaries	£16,013	14	3		
General charges	5,819	12	8		
				21,833	6	11
Law and parliamentary charges				960	6	3
Subscriptions and donations				2,985	15	9
Bad debts				1,073	5	5
				£621,341	11	5
Balance carried to profit and loss account				140,022	0	9
				£761,363	12	2

The accounts (which are signed by Mr. Charles Nickson, who has just retired from the position of Superintendent) are followed by the usual appendices, furnishing particulars in regard to the progress of the undertaking.

Appendix A is an abstract of the capital, revenue, and profit and loss accounts. It shows (*inter alia*) the amount of gross profit made from the gas undertaking, and the mode of its appropriation, also the amount of borrowed money owing, excess of assets, &c., from March 31, 1889, to March 31 last. The figures for the past financial year are as follows: Gross profit, £141,374; net profit, £89,873; contributed to sinking fund for redemption of debt, £63,766; paid over for improvement purposes and city fund, £60,000; applied in extension of works, £8839; borrowed money owing, £1,226,058; and excess of assets, £1,671,108. From June 24, 1843, the date when the works were taken over by the Corporation from the Commissioners of Police, the gross profits on the gas undertaking have amounted to £6,060,323, out of which £1,466,606 has been paid for interest—leaving a net profit of £4,593,717. Of this total, £1,468,844 has been placed to the sinking fund, £2,589,383 has been handed over to the Improvement Committee and added to the city fund, £329,202 has been paid for street lighting (making £2,918,585 used in relief of the rates), and £207,241 applied to extensions of works.

Appendix B is a comparative statement of the gas transmitted from the works in the daytime and during the twenty-four hours, for the past two years. Summarized, the figures are as follows:—

	Daytime. Cubic Feet.		Twenty-four Hours. Cubic Feet.
Year ended March 31, 1909	1,869,399,000	..	5,638,451,000
Do. Do. 1908	1,901,857,000	..	5,777,516,000
Decrease	32,458,000	..	139,065,000
			Cubic Feet.
Gas transmitted from the works			5,638,451,000
Do. accounted for			5,455,725,000
Loss (by condensation and leakage)			182,726,000
			or 3·24 per cent.

In Appendix C, particulars are given as to the results of the working from March 31, 1889, to March 31, 1909. The table contains statistics as to the number of tons of coal and cannel carbonized, the total make of gas, the percentage unaccounted for, the yield per ton of coal, the illuminating power of the gas, the quantity of residual products, &c., each year in the above-mentioned period. The particulars for the past financial year are as follows: Coal and cannel carbonized, 514,446 tons; gas made, 5,639,380,000 cubic feet; yield per ton of coal carbonized, 10,962 cubic feet; illuminating power, 17·72 candles; quantity sold, 5,380,025,000 cubic feet; quantity sold per ton, 10,458 cubic feet; percentage of output unaccounted for, 3·24; coke for sale, 211,855 tons; do. per ton of coal, 10·30 cwt.; make of tar, 27,986 tons; do. per ton of coal, 11·41 gallons; ammoniacal liquor (10-oz. strength) made, 11,734,961 gallons; do. per ton of coal, 28·52 gallons; sulphate made, 4224 tons; do. per ton of coal, 22·40 lbs.

Appendix D shows the number of stoves and of each size of meter in use during the year in the city and out-townships. At the close of the past financial year, there were 39,359 stoves within, and 7032 beyond, the city—together 46,391, compared with 35,076 and 6380 (together, 41,456) at the corresponding date in 1908; so that there was an increase of 4935. The number of meters in use was 174,290 in 1909 and 170,938 in 1908. There was last year a net increase of 3352 on the number for the preceding year. The number of prepayment meters in use on March 31 last was 58,041—an increase of 1673 on the number at the close of the preceding year.

From Appendix E, we learn that the gas-mains laid last year within the city extended to 26,978 yards, and beyond the city to 5786 yards; being 18½ miles and 67 yards. The mains taken up were 8285 and 1972 yards respectively—a total of 10,257 yards, or 5⅝ miles and 137 yards. The total net increase during the year, therefore, was 22,507 yards, or 12⅞ miles and 204 yards. The total length of mains on March 31 last was 1,628,780 yards, or 925¼ miles and 340 yards.

HALIFAX CORPORATION GAS ACCOUNTS.

The accounts of the gas undertaking of the Halifax Corporation for the year ended the 31st of March have lately been issued, and we have received a copy from the Gas Engineer and Manager (Mr. J. Wilkinson, F.C.S.). They show that the net revenue from the sale of gas was £80,777; meter-rents produced £2311; residuals, £25,669; and the total receipts were £110,242. The expenditure on the manufacture of gas was £43,252; on the maintenance of works, £8825; on distribution, £5683; on gas-stoves, £1735; and on management, &c., £5246—the total expenses being £71,433; leaving £38,809 to go to the profit and loss account. For the preceding year, the revenue was £115,987, the expenditure £75,243; and the gross profit, £40,744. The total amount on the net revenue account is £40,247; and £18,643 of it is taken for interest, £8925 for the sinking fund, £100 for the final instalment of the expenses connected with the Corporation Act of 1898, and £1045 for income-tax—leaving a balance of £11,534. This, added to the amount carried forward from March 31, 1908, makes a total of £25,889, which is thus disposed of: Transferred to the borough fund account in aid of the rates, £6000; to the district fund, do., £3000; to the reserve fund, £3616; making together £12,616, and leaving £13,273 to be carried forward. The bulk of coal carbonized was 72,843 tons, and 30,400 gallons of oil were used. The quantity of gas made was 823,998,000 cubic feet, of which 774,010,300 cubic feet were sold; the unaccounted-for gas being 40,614,400 cubic feet, or 4·91 per cent. The total receipts were 25·05d., the total cost of gas was 21·41d., the accident insurance fund came to 0·07d., and the balance of profit 3·57d. per 1000 cubic feet of gas sold.

BARRY GAS AND WATER UNDERTAKINGS.

The Past Year's Working.

The Manager of the gas and water undertakings of the Barry Urban District Council (Mr. T. E. Franklin) has presented his report on the working in the past financial year; and at a recent meeting of the Gas and Water Committee it was decided to have it submitted to each member of the Council prior to its consideration at the next meeting.

In the course of his report, Mr. Franklin says there was an increase of £1019 in the capital expenditure, caused mainly by the erection of two new beds of inclined retorts, without which the supply of gas could not have been kept up. There was a decrease of £619 in the revenue account compared with the year 1907-8 (£31,872 against £32,491), owing to a reduction in the price of gas and to a smaller return from residuals. With regard to expenditure, extra outlay was incurred for the maintenance of works and plant; the amount spent being £995 more than in the preceding year. But good value for it has been received, as the whole of the plant has been more or less renovated and put into something approaching fair working order. There was a decrease of £754 in the expenditure for coal. The gross profits are £659 less, and the net profits £354 less, than before; the figures being £3619, against £3973. The make of gas was 158,156,000 cubic feet, or 9,358,000 cubic feet more than in 1907-8 with only 200 tons more coal used; and the quantity sold was 153,649,750 cubic feet—an increase of 10,575,201 cubic feet. The quantity of gas unaccounted for was about 1½ millions lower than before, and shows the extremely low proportion of less than 0·4 per cent. of the make, assuming the station meter to be registering correctly. The average make of gas per ton was 10,069 cubic feet—an increase of 474 cubic feet, due to the erection of a tar-tower, the working of the governors, and alterations made in the hydraulic mains. In the first six months of the year, these improvements had not been made.

In the Water Department there was an increase of £67 in the rentals; the amount received being £9528 against £9461. The waste of water was materially reduced by more frequent inspections, washering taps, and serving notices for the repair of defective fittings. In addition to 7424 calls, Mr. Franklin had one complete house-to-house inspection made, and another was about half finished at the end of the financial year. The gross profits were £5106, against £4730; and the deficiency for the year is lower by £1162 (£2749, against £3911).

The net profit on the gas undertaking being £3619, and the net deficiency on the water undertaking £2749, the net profit is £870. But Mr. Franklin explains that had the price of gas not been lowered in January last year, this amount would have been increased by upwards of £3000; and if coke had not been reduced 3s. 4d. per ton it would have been more than £3600. The net profit is the highest on record.

Reduction in Price at Bath.—The Directors of the Bath Gas Company have reduced the price of gas 1d. per 1000 cubic feet; bringing it down to 1s. 11d.

Improperly Using Gas.—Edward Morgan, a Bolton plumber, was recently fined 10s. and costs for improperly using gas. Mr. Bradbury, who prosecuted, said the meter had been left coupled up in the ordinary way with the service-main, and it was found that the defendant had disconnected the service-pipe, so that the gas had not passed through the meter, and the Corporation officials could not tell what amount had been used. But the Corporation fitter found out that the tenant had been nearly suffocated the previous day, so that he must have used a considerable quantity. The Gas Committee regarded the offence in a serious light. The defendant said he was looking for a gas escape; but Mr. Bradbury remarked that he had no right to find an escape in this way, as it could be done by a very simple process.

COMPLETION OF THE CARLISLE WATER SCHEME.

Opening of the Castlecarrock Reservoir.

Though the citizens of Carlisle have for months been in possession of a water supply from the Geltsdale Valley, it was not until last Thursday week that the water was turned into the great reservoir at Castlecarrock. This forms the practical completion of the Carlisle water scheme, which has cost the city something like £275,000. It is twelve years since the Town Council determined to go to Geltsdale for a gravitation water supply to take the place of the old scheme of pumping from the River Eden; and the construction of the reservoir at Castlecarrock has been a work which involved a good deal of controversy and not a little anxiety to all concerned. The contract for the reservoir was let in 1905 to Messrs. Arnold and Sons, of Leeds and Doncaster; the amount of their tender being £61,733. It has always been recognized that the construction of this reservoir, and more especially of the great dam which forms one side of it, where the depth of water is greatest, was the *crux* of the scheme from the engineering point of view; and some fears were entertained lest the Engineers (Messrs. James Mansergh and Sons) might have a difficulty in finding a solid foundation for the mass of masonry and concrete. These misgivings have happily proved unfounded. About two years ago, Mr. Ernest Mansergh was able to report to the Corporation that a good foundation on the rock had been obtained at a depth of 130 feet; and since then the work has proceeded without any serious hitch or interruption. The reservoir has a top-water area of 43 acres, a maximum depth of water of 33 feet, and a capacity of 170 million gallons above the lowest draw-off level. At the time of the opening, it was filled to the extent of 6 feet below the overflow level; and it had the appearance of a small lake measuring about five-eighths of a mile long and 800 feet wide from bank to bank.

The members of the Corporation, the chief officials, and a few invited guests, assembled at the Town Hall, where motor-cars and carriages were in waiting to convey them to Castlecarrock. On arriving at the reservoir, Sir Benjamin Scott, the Chairman of the Water Committee, invited the Mayor (Mr. W. B. Maxwell) to perform the inaugural ceremony by raising one of the valves in the valve-tower. His Worship complied, and the water poured into the filter-beds amid the cheers of the company. He then formally declared the reservoir open, and by so doing brought into use part of what he characterized as the most important undertaking with which Carlisle had ever been concerned. It had been carried out at immense cost; but he was one of those who held the opinion that the benefits of a plentiful supply of pure and wholesome water to any community could not be measured in pounds, shillings, and pence. The Corporation were deeply indebted to the Engineers, particularly the late Mr. James Mansergh, who, from local connections, was very much interested in Carlisle; to Mr. Ernest Mansergh, the present head of the firm, upon whom the responsibility for the success of the undertaking had fallen, for the care and attention he had given to it; to the Contractors, who set about their work with spirit, and had successfully carried it out without friction; and last, but not least, to Mr. Wilfrid Lewis, the Resident Engineer in charge of the work, to whose ability, industry, and attention in the discharge of his duties the Water Committee at their last meeting paid a high tribute.

Mr. Ernest Mansergh then addressed the assembly. He congratulated the Corporation and the citizens of Carlisle on having in their possession a water supply which, in his opinion, was second to none in the country. It was pure water, of a quality which was undoubted, a very soft water, and therefore adaptable to all domestic as well as to manufacturing purposes; and there was plenty of it. Though the estimates which were made years ago had been far exceeded, the water as supplied to-day was not expensive as waters went. They also possessed a fine storage reservoir, which he thought he might say with perfect certainty was absolutely water-tight. His personal relations with the Water Committee and all the officials and the members of the Corporation had been most pleasant; and he thanked them very heartily. He should like to congratulate Messrs. Arnold and Son on the business-like way in which they had tackled their job. Finally, he wanted to address a few words of thanks to Mr. Lewis, the Resident Engineer, who had seen the work through from beginning to end. He could only say that Mr. Lewis had carried out his duties most efficiently and energetically. Messrs. Mansergh had always trusted implicitly to his judgment, and with good reason; for, whenever there had been any difficulty, Mr. Lewis had not only let them know about it, but had always had some valuable suggestions to make as to the way of getting over the trouble. This, in his opinion, was what the resident engineer ought to be. Finally, he would like to congratulate the Mayor on being concerned in the final stages of this great undertaking; and, on behalf of his brother and himself, ask his Worship's acceptance of a memento of a very auspicious occasion, with his hearty good wishes for his health and prosperity for many years to come. He then presented the Mayor with a handsome rose bowl of silver plate, mounted on an ebony stand, and bearing the following inscription: "Carlisle Corporation Water-Works: Geltsdale Scheme. Presented to W. B. Maxwell, Esq., Mayor of Carlisle, by the Engineers, Messrs. James Mansergh and Sons, on the occasion of the Inauguration of the Castlecarrock Reservoir; 22nd July, 1909."

Mr. Harold Arnold, on behalf of himself and his son, then asked the Mayor to accept a silver salver from them, to commemorate the completion of what he felt was a great undertaking, which would be of considerable benefit to the citizens of Carlisle, and to its trade and commercial concerns. The salver bore the following inscription: "Carlisle Water-Works. Presented by the Contractors to W. B. Maxwell, Esq., Mayor, on the completion of the Castlecarrock Reservoir; July 22nd, 1909."

The Mayor, in returning thanks for the gifts, said he should always treasure them, not only because they bore witness to his connection with the Corporation, but also to his association with the great work now completed.

A hearty vote of thanks was then accorded to the Mayor, who briefly acknowledged it, and invited all present to take luncheon with him. A pleasant feature of the subsequent proceedings was the presentation by Sir Benjamin Scott, on behalf of the Water Committee and himself, of a silver salver to Mr. Lewis, as a memento of his work in Carlisle. Mr. Lewis, in accepting the gift, said he was proud to receive it as a mark of the appreciation of the Water Committee of his services as Resident Engineer under Messrs. Mansergh. The company afterwards separated to inspect the works.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The annual meeting of the North British Association of Gas Managers at Stirling on Thursday was a gathering of which there can only be pleasant memories. It was very large, the company numbering considerably over a hundred. It is difficult to determine what was the impelling power which brought so many of the members together. It was not the wealth of technical fare provided, for it was not by any means of the first water; the topics put down for discussion being quite within the designation of a work-a-day nature. The personality of the President—Mr. J. D. Smith, of Stirling—probably went a long way in attracting members; the convenient situation of the town might be another reason; and the fact that the meeting was to be called upon to revise the rules of the Association, coupled with which there was the proposal to exclude the commercial element, may have been a third. Perhaps the most powerful of all is the one which I state last—viz., that the Association is now under new management. The voices which used to predominate in the councils of the Association are silent. Members who formerly hesitated to come forward in the presence of their seniors have now no dividing wall to get over if they wish to take a prominent part in the business; and, indeed, the thoughtful among them must feel that it is incumbent upon them to be energetic in the interests of the Association if it is to prosper. The advent of new power was apparent, if there were no other indications, by the putting forward for consideration of an entirely new set of rules and regulations. A task so great would scarcely have been undertaken by a body of men well settled down. It required a Committee new to office—men full of zeal and solicitude for the future—to apply themselves to such hard work. The Committee faced the situation; and they have carried a set of rules which are certainly complete, and appear to be capable of covering almost every situation that might conceivably arise. For the compilation of these rules, credit must be given to the President, to the Secretary (Mr. L. Hislop), and, I understand, to Mr. G. Keillor, of Broughty Ferry, one of the Vice-Presidents. The anticipation that the commercial element was to be excluded from the Association has been realized to this extent, that henceforth gentlemen in trade will not be eligible for election as extraordinary members, unless they are principals or managers of trading concerns. The commercial traveller is no longer to be eligible for election. It is left to the Council to determine who are principals of a firm. If they give a liberal interpretation, the new rule will make very little difference to the membership. If, for instance, a gentleman acting as a commercial traveller should also happen to have an interest in the business, he may be held to be a principal. In this case there might be a number of principals in a business eligible for election. If this were so in cases of private firms, how would the Directors of public companies fall to be dealt with? And how, also, would commission agents? These are questions that may be expected to come before the Council, which seems to be the name by which the Committee will henceforth be known; and if they have any difficulty in making up their mind as to who should be admitted, the Association will keep them right. The work of revising the rules was expected to occupy a considerable time. As a matter of fact, owing to the tact of the President—a quality which he displayed all through the proceedings—it was soon over; and the meeting had ample time to consider the technical subjects that came before them. These were three in number, and related to carburetted water gas, high-pressure gas supply, and retort-settings. The papers outshone the discussions, owing, most probably, to the fact that they were informative and not controversial. The work done was of a useful nature, and when account is taken of it, and of the more than usually successful social functions connected with the meeting, members will, on retrospection, have every reason to feel gratification at what transpired at the annual meeting of 1909. Thanks to the excellent arrangements made by the Secretary, the proceedings, from first to last, went without a hitch. The Association have re-elected Mr. Hislop to the office; and, judging by the success which has attended all departments of the work since he assumed office, the members are wise in having continued their confidence in him.

At a special meeting of the Coatbridge Town Council on Thursday, the Clerk reported that the Select Committee of the House of Lords had agreed to the confirmation of the Provisional Order of the Coatbridge Gas Company, in which authority is given to reduce the illuminating power of the gas, though the Town Council had asked for certain modifications. A letter was read from Mr. Lewis Coward, K.C., and Mr. Reginald Neville, pointing out that the Corporation might very well be of opinion that, having made their protest and failed, it did not follow that a Committee of the House of Commons would uphold the decision of the Committee of the other House; and their advice was that, in any event, a petition should be deposited against the Confirmation Bill in the House of Commons, so as to keep the matter open for further consideration. The Town Council, by a majority, adopted the advice, and resolved to lodge a petition against the Bill.

Following upon the adoption of the annual accounts of the Edinburgh and Leith Gas Commission, mentioned in last week's "Notes," there has been issued the customary appendix to the accounts prepared by Mr. John S. Gibb, the Treasurer. The chief figures in the accounts were given in the "JOURNAL" for June 29 last (pp. 984, 990), and this document necessarily repeats a great deal of what has been already published; but it puts in succinct and official form a mass of information regarding the accounts which must be helpful to the individual Commissioners who wish to make themselves better acquainted with

the details of the business than they can be from the information supplied to them from month to month.

The annual general meeting of the Bo'ness Gas Company, Limited, was held last Monday. The Chairman (Mr. L. H. Ballantine), in moving the adoption of the accounts, referred to the very satisfactory results of the year's working. The increase in the quantity of gas made was 1,368,000 cubic feet; and the profit, after allowing £584 for depreciation, amounted to £795. The usual dividend of 5 per cent. was declared; and the Manager (Mr. James Campbell) was granted an honorarium and an increase of salary.

Reverting to the working of the Kelty Gas Company, Limited, for the past year, the balance-sheet disclosed profit at credit of net revenue account to the amount of £1307. The shareholders, at their meeting on Wednesday of last week, approved of the recommendation of the Directors to pay a dividend of 7½ per cent., and to abolish the charges for meter-rents. After remarking on the satisfactory nature of the balance-sheet, and the sound state of the working generally, the Chairman announced that, the arrears of cumulative dividend being now wiped off, the sliding-scale of charges would come into operation, whereby payment of each ¼ per cent. of dividend over 5 per cent. to the shareholders would be accompanied by a decrease in price of 1d. per 1000 cubic feet from the standard prices of 4s. 2d. per 1000 cubic feet to ordinary, and 4s. 4½d. to prepayment consumers; and as the Company were in a position to increase their output without additions to the manufacturing plant, the prospect before them was very hopeful and encouraging.

Meter-Testing at Coventry.—At Coventry, the Gas-Meter Testing Department is carried on in conjunction with the Weights and Measures Department. In a report just issued, it is stated that the number of meters tested during the past year was 2499, of which 14 were wet, and 2485 dry. The fees for testing and stamping realized £75. The expenditure amounted to £23, which shows a balance of £52 of income over outgoings.

Public Lighting of Westminster.—A few months ago, the Town Clerk of Westminster was instructed to negotiate with the Gaslight and Coke Company for all their contracts for public street lighting in the city to terminate at one time. The dates of expiration were as follows: Low-pressure incandescent lamps, St. James's, Strand district, &c., Lady Day, 1910; St. Martin and St. Margaret and St. John, Dec. 31, 1909; high-pressure incandescent lamps, Aldwych, Kingsway, Parliament Street, Whitehall, Wellington Street and Strand by the Law Courts (refuge lamps), Parliament Street, Whitehall, Wellington Street and Strand by the Law Courts (supplemental), Nov. 2, 1910; Parliament Square, Aug. 26, 1910; Parliament Street and Whitehall (Scott-Snell lamps), Dec. 31, 1909. Having regard to the dates of termination, it appeared to the Works Committee that the most convenient arrangement would be for the low-pressure contracts to terminate on March 31, 1910, and the high-pressure contracts on Dec. 31 of the same year; and the Company have agreed to this.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *July* 30.

Demand has been fairly well maintained; but there has been nothing special about it, and the month's requirements have been covered without occasioning any advance in prices. Direct orders have, in fact, been rather scarce; buyers abroad being fairly well covered by purchases made in advance, and being in no hurry to supplement their purchases. The closing prices are £11 1s. 3d. per ton f.o.b. Hull, £11 3s. 9d. per ton f.o.b. Liverpool, and £11 5s. per ton f.o.b. Leith. For delivery ahead the situation is unchanged; offers from abroad for delivery over the ensuing six months being scarcely 2s. 6d. per ton above spot values, and makers altogether refusing to entertain them. The spring months are neglected, owing to the firm attitude of makers.

Nitrate of Soda.

This article remains unchanged at 9s. 9d. per cwt. for 95 per cent. quality, and 10s. per cwt. for refined, less 2½ per cent. on spot.

Tar Products. LONDON, *July* 30.

With reference to the prices quoted for tar in the "JOURNAL," owing to the severe competition existing between certain well-known firms in some districts, as also to the demand for the roads, figures are paid which are out of all proportion to the parity value of the article for distilling purposes. It would not, however, be just to quote these as the value of the article. Last week the top price was recorded at 20s. 6d.; this should have been 19s. 6d. There is very little fresh to report in the markets this week. Pitch is decidedly firm, and creosote remains steady. There is certainly a little more inquiry for the former article for both prompt and forward delivery. There has been a little inquiry for 90 per cent. benzol; but it is not having any effect on the market. Crude carbolic is weak, and Continental consumers advise having purchased 60's quality at 10⅜d. f.o.b. English ports.

The average values during the week were: Tar, 15s. 9d. to 19s. 9d., Pitch, London, 28s. 6d. to 29s. 6d.; east coast, 28s. 6d. to 29s.; west coast, 28s. to 29s. f.a.s. Mersey ports, 27s. 6d. to 28s. f.o.b. other ports. Benzol, 90 per cent., casks included, London, 6½d. to 6⅝d.; North, 6d. to 6¼d.; 50-90 per cent., casks included, London, 7d. to 7¼d.; North, 6⅝d. to 7d. Toluol, casks included, London, 8¼d. to 8½d.; North, 7⅞d. to 8d. Crude naphtha, in bulk, London, 3¼d. to 3½d.; North, 3d. to 3⅛d.; solvent naphtha, casks included, London, 10⅜d. to 11d.; North, 9⅞d. to 10d.; heavy naphtha, casks included, London, 10½d. to 10¾d.; North, 9½d. to 9⅝d. Creosote, in bulk, London, 2⅜d. to 2 1/16d.; North, 2½d. to 2⅝d. Heavy oils, in bulk, 2⅞d. to 3d. Carbolic acid, 60 per cent., casks included, east coast, 10⅜d. to 11d.; west coast, 10½d. to 10¾d. Naphthalene, £4 10s. to £8 10s.; salts, 37s. 6d. to 40s.,

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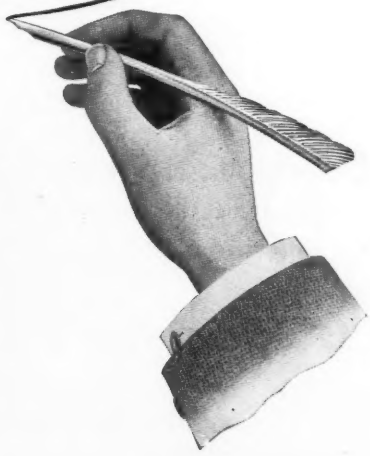

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packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is certainly very quiet, and Beckton prompt is quoted at £11 7s. 6d. Ordinary makes upon Beckton terms are £11 to £11 2s. 6d., and Hull is £11 to £11 2s. 6d.; while in Liverpool the prices are from £11 2s. 6d. to £11 3s. 9d., and in Leith £11 5s. to £11 6s. 3d.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade has been irregular; the Scotch difficulty being the main factor. Local unrest has, however, also been known, and has limited the output at many collieries in the north-east and affected the prices in some degree. In the steam coal trade, best Northumbrians are generally quoted at from about 12s. 9d. to 13s. 6d. per ton f.o.b., though there have been sales at 6d. per ton below the lowest of these figures. Second-class steams are about 11s. per ton f.o.b., and steam smalls are firm and rather scarce at from about 5s. 3d. to 6s. 3d. There has also been some movement in gas coals. The demand is full, more especially for best qualities; the price having risen through the enlarged requirements for export. Durham gas coals are quoted from about 10s. to 11s. 6d. per ton f.o.b., according to quality; while for "Wear specials," perhaps 3d. to 6d. per ton more is quoted. All these prices are, however, subject to the variations that are forced by the uncertainty lately prevailing in the coal trade. Gas coke is quiet, at about 12s. 9d. to 13s. per ton f.o b. in the Tyne.

Scotch Coal Trade.

Trade in coal has been much disturbed, on account of the protracted negotiations between the coalmasters and the miners' leaders, which have now closed. Shipping is greatly upset, chiefly on account of the scarcity of tonnage at Scotch ports. There is a very large demand for coal for home consumption. The prices quoted are: Ell 10s. per ton f.o.b. Glasgow, splint 10s. 6d. to 11s., and steam 10s. to 10s. 6d. The shipments for the week (being holiday week) were small, amounting to 183,603 tons, which was less than in the previous week by 162,732 tons, but greater than in the corresponding week by 14,898 tons. For the year to date, the total shipments have been 7,856,032 tons—an increase of 172,047 tons upon the corresponding period.

The revenue of the Rand Water Board for the year ended March 31 last was £177,156; and after paying interest on the stock and all expenses, there was a balance of £3871. As, however, £8000 has been placed to machinery and plant renewal fund, there is a debit balance of £1987, after including £2142 brought forward.

Schultz, Comins, and Co.—Dissolution of Partnership.

It has been announced that the firm of Messrs. Schultz, Comins, and Co., Chartered Accountants, of No. 50, Cannon Street, E.C., dissolved partnership, by effluxion of time, on the 31st ult. The practice was originally founded in 1887 by Mr. W. A. Schultz, F.C.A., who had served his time with the late Mr. William Liddall, the Secretary of the old Brighton Gas Company, until its amalgamation with the present Brighton and Hove Gas Company. He was joined in 1890 by Mr. Charles Comins, F.C.A., and they together carried on the practice of Chartered Accountants until 1902, when they took in two of their staff, Messrs. W. Wesson and A. H. S. Emerson, as junior partners. Mr. Schultz was also the Secretary of the Whitchurch and District (Hants) Gas Company, and the Soham and District Gas Company; and, on the retirement of Mr. Liddall, he was appointed Secretary of the Ascot District Gas Company, which office he still holds. This Company applied to Parliament in 1906 for electrical powers; and the Bill having been granted, the Company enjoys the reputation of being the first Gas Company to exercise electricity powers. The venture has so far been a great success; and Mr. Schultz has been largely responsible for its successful accomplishment. In 1904, Mr. Schultz and Mr. Comins bought the interests of the shareholders in the Brixham Gas Company (then in a decadent condition), obtained an Act of Parliament, and have entirely remodelled the works; and this is now a highly prosperous concern. They dealt in like manner with the works at Crediton (Devonshire), Hungerford, Saxmundham, and Annfield Plain (Durham). All of these Companies are increasing and successful undertakings. Both Mr. W. A. Schultz, F.C.A., J.P., and Mr. Charles Comins, F.C.A., continue to practise separately at No. 50, Cannon Street—the former as W. A. Schultz and Co. and the latter as Charles Comins and Co. Mr. Schultz retains the secretaryship of the Ascot District Gas and Electricity Company, and the control of the Brixham Gas Company, the Crediton Gas Company, the Hungerford Gas Company, the Whitchurch and District (Hants) Gas Company, and the Soham Gas Company; while Mr. Comins will control the Annfield Plain and District Gas Company and the Saxmundham Gas Company. Both retain their seats, as formerly, on the Boards of these Companies. The arrangement is, we are informed, of a purely friendly character; and their respective interests in the Companies are in no way disturbed.

Profit Sharing in the New Haven (Conn.) Gas Company.—We learn from the "American Gaslight Journal" that stock certificates were distributed on the 10th ult. by the New Haven (Conn.) Gas Company to the employees who have taken advantage of the working of the profit-sharing plan started in April, 1907. The total number of shares thus issued totalled to 551, divided among 197 of the employees. The writer of the paragraph in the American paper says: "Some of his Eastern contemporaries were inclined to smile at Mr. Nettleton when he advocated this plan as far back as 1903; but the laugh now is altogether with him in the result."

APPRECIATIONS.

SERIES No. 6.

The CLERK of an Urban District Council writes:—

"I was instructed to inform you that the Gas Committee greatly appreciate the assistance you have rendered by your **TEMPORARY SHOWROOM and CANVASS of CONSUMERS,** and formally resolved that the thanks of the Committee be tendered to you for the same."

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Bermondsey Explosion.—It has been reported by the Electricity Committee of the Bermondsey Borough Council that their expenditure consequent upon the deplorable Grange Road explosion recently amounts to £176. From this, it is seen that (though no allegation was made that the electricity system had part in the explosion) it was involved to the extent of sustaining damage.

Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, on Monday last week, Messrs. A. & W. Richards sold, by order of the Directors, £8000 of consolidated ordinary stock of the Epsom and Ewell Gas Company. It ranked for a standard dividend of 5 per cent., subject to the sliding-scale, equally with the Company's existing similar stock, the interim dividend on which for the first half of the current year has been declared at the rate of £5 17s. 6d. per cent. per annum. The new issue was all sold at from £115 to £115 10s. per £100. At the offices of the Newcastle and Gateshead Water Company, last Tuesday, 448 lots, of £100 each, of the Company's 5 per cent. preference stock of 1902 were sold by auction by Mr. Charles A. Joel at an average price of £137 12s. 2¼d. per £100. The total sum realized was £61,649; the premiums amounting in the aggregate to £16,489.

Proposed Improvement of the Plymouth Water-Works.—The question of the duplication of the main from the storage reservoir at Burrator to the service reservoir at Roborough has been again under the consideration of the Water Committee of the Plymouth Corporation. A Sub-Committee to whom the matter had been referred reported that the 25-inch main conveying the water between the places named was becoming corroded, and that in consequence of this its delivery capacity was reduced to 6¾ million gallons per day. In dry, hot weather the demand rose to over 7 million gallons; and to meet the deficiency either the pipe was put under full reservoir pressure without screening the water, or the leat was used. Neither method was so satisfactory as passing the water through the screening chamber. Various ways of improving and extending the means of conveying water were submitted by the Water Engineer (Mr. F. Howarth). The present main could be scraped at a cost of £700, or a second screening chamber constructed at a higher level, so as to increase the pressure, at an expenditure of £1653. The cost of laying a second main would be as follows: With a cast-iron pipe 25 inches in diameter, £29,246; with a 27-inch pipe, £33,840; with a 28-inch pipe, £35,827; with a 25-inch steel pipe, £29,705; with a 27-inch pipe, £32,538; with a 30-inch pipe, £35,626. The cost of a reinforced concrete pipe would be £27,584, £30,020, £32,110, and £35,178 respectively for the above-named sizes. As an alternative, the old leat might be repaired or reconstructed. The cost of repairing it would be £3000; but if it were reconstructed in a permanent manner, it would be from £35,000 to £40,600. The Committee came to the conclusion that it was inadvisable to undertake large capital expenditure at present, but that any extension of the existing means of conveying water between the two reservoirs should be on the lines of rendering the leat permanently serviceable. In the meantime, the Water Engineer is to submit an estimate of the cost of fixing hatch-boxes and scraping the existing main, for inclusion in next year's estimates.

Reduction in Price by the South Suburban Gas Company.—The Directors of the South Suburban Gas Company have announced a reduction in the price of gas from 2s. 6d. to 2s. 5d. per 1000 cubic feet, to take effect after the Midsummer quarter's account.

Melbourne Metropolitan Gas Company.—Messrs. John Terry and Co., the London agents for this Company, have been informed by cable that the profits for the half year ended the 30th of June last were £84,830. A dividend of 5s. per share has been declared for this period; a sum of £40,000 has been added to the reserve fund; and a balance of £4900 is carried forward.

Crowthorne Public Lighting.—The Crowthorne Parish Council have entered into an agreement with the Yorktown and Blackwater Gas Company to light the district from the 1st of October next to March 31, 1910. The lamps are to be fitted with incandescent burners, and erected at a cost of £3 10s. each; while the maintenance for the period stated is to be £1 8s. per lamp.

Reduced Charge for Public Lighting at Lewisham.—The Highways Committee of the Lewisham Borough Council have received a letter from the Secretary of the South Metropolitan Gas Company stating that, as the result of experiments made with a new inverted burner specially designed for street lighting, the Company are able to make a substantial reduction in the yearly charge. This has hitherto been at the same rate as for the No. 4 burner—viz., £3 4s. 5d.; but by the reduced cost of upkeep and the lower charge for gas, they will now reduce the figure to £2 19s. 6d. As the inverted gas-burner gives a light of 120 candles, compared with 80 candles for the No. 4 burner, the reduction in the cost of lighting by its use will be very considerable, especially as the conversion only costs 3s. a lamp. The Secretary further stated that by reason of the lower price for gas, which came into operation at Midsummer, the charges for the No. 2, No. 3, and No. 4 burner lamps will be reduced to £2 8s. 3d., £2 15s. 6d., and £3 2s. 10d. respectively. The alterations will reduce by £109 18s. 6d. per annum the charge by the Company for public lighting in Lewisham.

Charge for Public Lighting in Hanley.—A revised scale of charges has been made by the British Gaslight Company for public lighting in Hanley. At the meeting of the Hanley Town Council last Tuesday, a letter from the Company was read, stating that the charges would be as follows: Lamps having 5 cubic feet flat-flame burners, £2 8s. 4d. per annum; lamps having triple 5 cubic feet flat-flame burners, £6 18s. 10d. per annum; lamps having single incandescent burners, £2 8s. 4d. per annum; lamps having single incandescent burners, extinguished at 11 p.m., £1 17s. 8d. per annum; lamps having double incandescent burners, all night, £4 3s. 8d. per annum; lamps having double incandescent burners, extinguished at 11 p.m., £2 17s. 10d. per annum; lamps having double incandescent burners, one burner all night, and one till 11 p.m., £3 12s. 10d. per annum; and lamps having triple incandescent burners, one burner all night, and two till 11 p.m., £4 13s. 2d. per annum. The reduced charges include cost of lighting, extinguishing, cleaning, painting, and all repairs, and, in the case of incandescent burners, the maintenance of the mantles. The reductions take effect from the 1st inst.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 300.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl 6	10	Alliance & Dublin 10 p.c.	17⅜—18¼	..	5 9 7
298,955	10	,, 7		Do. 7 p.c.	12½—13	..	5 7 8
310,000	Stk.	July 14	4	Do. 4 p.c. Deb.	96—98	..	4 0 0
200,000	5	May 27	6½	Bombay, Ltd.	5⅞—6⅛	..	5 10 8
40,000	5		6½	Do. New, £4 paid	4⅞—4⅝	..	5 12 5
50,000	10	Feb. 25	14	Bourne- } 10 p.c.	28½—29½	..	4 15 9
51,810	10	,,	7	mouth Gas } B 7 p.c.	16¾—17¼	..	4 1 2
53,200	10	,,	6	and Water } Pref. 6 p.c.	15⅜—15⅝	..	3 15 7
380,000	Stk.	,,	12½	Brentford Consolidated	254—257	..	4 17 3
300,000	,,	,,	5½	Do. New	19—11·7	..	4 16 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	..	4 0 8
206,250	,,	June 11	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
220,000	Stk.	Mar. 12	10⅝	Brighton & Hove Orig.	212—214	..	5 0 6
246,320	,,	,,	7¼	Do. A Ord. Stk.	154—156	..	4 19 4
467,000	20	Apl. 16	10	British	43—45⅜	..	4 11 11
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	119—121	..	4 19 2
165,700	,,	,,	4½	Do. B 3½ p.c.	89 91	..	4 18 11
82,278	,,	,,	5½	Do. C 5 p.c.	108—110	..	5 0 0
57,000	,,	June 25	3½	Do. 3½ p.c. Deb.	88—90	..	3 17 9
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13½—14	..	5 0 0
250,000	Stk.	June 25	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	4½—5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅛—6	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48½—49½	..	6 1 3
100,000	Stk.	June 25	4½	Do. 4½ p.c. Deb. Stk.	82 84	..	5 7 2
157 150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109—111	..	4 10 1
1,493,280	Stk.	Mar. 12	5⅛	Commercial 4 p.c. Stk.	108—110	..	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do.	104—106	..	4 14 4
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800,000	Stk.	,,	5	Continental Union, Ltd.	96—58	..	5 2 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—140	..	5 0 0
493,270	Stk.	—	5	Derby Con. Stk.	121—123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	Mar. 31	5	East Hull 5 p.c. Ord.	100—102	..	4 18 0
486,690	10	July 14	12	European, Ltd.	24½—24⅝	..	4 17 0
354,660	10	,,	12	Do. £7 10s. paid.	8½—18¾	..	4 16 0
15,161,545	Stk.	Feb. 11	4⅜†	Gas } 4 p.c. Ord.	104½—105¼	..	4 8 8
2,620,000	,,	,,	3½	light } 3½ p.c. max.	88—90	..	3 17 9
3,799,735	,,		4	and } 4 p.c. Con. Pref.	105—107	..	3 14 9
4,193,975	,,	June 11	3	Coke } 3 p.c. Con. Deb.	95¼—£6½	..	3 9 4
258,740	Stk.	Mar. 12	4½	Hastings & St. L. 3½ p.c.	93—95	..	5 0 0
82,500	,,	,,	6¼	Do. do. 5 p.c.	118—120	..	5 4 2
70,000	10	Apl 29	11	Hongkong & China, Ltd.	17½—18	..	6 2 3
123,500	Stk.	Mar. 12	6½	Ilford A and C	141—143	..	4 10 11
65,780	,,	,,	5	Do. B	106—108	..	4 12 7
63,000	,,	June 25	4	Do. 4 p.c. Deb.	102—104	..	3 16 11
4,949,000	Stk.	May 13	8	Imperial Continental	179—181	..	4 8 5
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	95—97	..	3 12 2

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	120—122	..	4 18 4
561,000	Stk.	Feb. 25	10	Liverpool United A	226—228	..	4 7 9
718,100	,,	,,	7	Do. B	168—170	..	4 2 4
306,083	,,	June 25	4	Do. Deb. Stk.	104—106	..	3 15 6
75,000	5	June 11	6	Malta & Mediterranean	4⅛—5⅛	..	5 17 1
500,000	100	Apl. 1	5	Met of } 5 p c. Deb.	100—102	..	4 18 1
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	May 27	3½	Monte Video. Ltd.	12½—13	..	5 7 8
1,775,892	Stk.	Feb. 25	4½	Newc'tle & G'tesh'd Con.	107⅓—108½	..	4 2 11
518,795	Stk.	June 25	3½	Do. 3½ p.c. Deb.	91—93	..	3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.	19½—20	..	5 0 0
55,940	10	,,	7	Do. 7 p c	13—13½	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	137—139	..	5 15 1
60,000	5	Mar. 31	8	Ottoman, Ltd.	6⅞—6⅞	..	6 5 6
31,800	53	Feb. 25	13	Portsea Island A.	140—142	..	4 16 11
60,000	50	,,	13	Do. B.	132—134	..	4 17 0
100,000	50	,,	12	Do. C.	123—125	..	4 16 0
114,800	50	,,	10	Do. D and E.	103—105	..	4 15 3
398,490	5	May 13	7	Primitiva Ord.	6⅞—7⅛	..	4 18 3
796,583	5	July 29	5	Do. 5 p.c Pref.	5⅞—5⅞*	..	4 10 11
488,902	100	June 1	8	Do. 4 p.c. Deb.	91—96	..	4 3 4
1,740,000	10	Apl. 29	8	River Plate Ord.	15½—16¼	−¼	4 18 6
312,650	Stk	June 25	4	Do. 4 p.c. Deb.	96—58	..	4 1 8
250,000	10	Mar. 31	8	San Paulo, Ltd.	14—14½	..	5 10 4
£2,500	10	,,	6	Do. 6 p.c. Pref.	12—12½	..	4 16 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	49½—50½	..	4 19 0
135,000	Stk	Mar. 12	10	Sheffield A	236—238	..	4 4 0
269,984	,,	,,	10	Do. B	233—235	..	4 5 1
523,500	,,	,,	10	Do. C	233—235	..	4 5 1
70,000	10	June 11	10	South African	13¾—14	..	7 2 10
6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.	122—124	..	4 6 0
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	84½—85½	..	3 10 2
209,820	Stk.	Mar. 12	8	South Shields Con. Stk.	153—155	..	5 3 3
605,000	Stk.	Feb. 25	5½	S'th Suburb'n Ord. 5 p.c.	120—122	..	4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	..	4 0 8
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	122—124	..	4 0 8
502,310	Stk.	May 13	5	Southampton Ord.	110—112	..	4 9 3
120,000	Stk.	Feb. 25	6½	Tottenham } A 5 p.c.	132—134	..	5 0 9
423,940	,,	,,	5½	and } B 3½ p.c.	111—113	..	4 12 11
149,470	,,	June 25	4	Edmonton } 4 p.c. Deb.	59—101	..	3 19 3
182,380	10	June 11	8	Tuscan, Ltd.	9—9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	111—113	..	4 8 6
255,6 6	Stk.	Feb. 25	6½	Wands- } B 3½ p.c.	139—141	..	4 12 2
79,416	,,	June 25	3	worth } 3 p.c. Deb. Stk.	73—75	..	4 0 0
85,272	,,	Feb. 25	5½	West Ham 5 p.c. Ord.	123—125	..	4 4 0
210,000	,,	,,	5	Do. 5 p.c. Pref.	126—128	..	3 18 2
253,300	,,	June 25	4	Do. 4 p.c. Deb. Stk.	105—107	..	3 14 9

Prices marked * are "Ex div." † Next dividend will be at this rate.

When last week the gas was turned on at the new Pavilion Theatre at Market Drayton, it could not be lit. It was then discovered that the workmen had connected the gas-pipes with the water-mains.

Mr. R. Toller, a member of the Birmingham Corporation, and at one time a prominent official of the Gas Workers' Union, has been expelled for consenting to act for a short time as Secretary of a society, to be called the Birmingham and District Municipal Employees' Association, which has been formed by the enginemen's branch of the Union. This act is regarded as an attempt to injure the organization. Mr. Toller was one of the founders of the Union; having started it with some of his fellow-workmen while employed at the Saltley Gas-Works. He took an active part in bringing about the eight-hour shift, abolishing Sunday labour, and securing time-and-a-half for all Sunday work under the Corporation.

The Australian Coking and Bye-Products Company, Limited, has been formed with a capital of £200,000, in £1 shares (100,000 preference) to carry on the business of manufacturers of, and dealers in, coke, coal tar, pitch, and other bye-products of coal.

A curious point has arisen at Leyton in regard to the supply of electricity to motors for producing high-pressure gas. The matter was brought up at the meeting of the Urban District Council last Tuesday on a report from the Electrical Engineer asking for instructions as to the charge to be made where a motor is used solely for the purpose named. Such a motor, he stated, was evidently not employed at the times which the power rate was intended to cover, but coincidentally with electricity for lighting purposes only. It was resolved that in future electricity supplied to motors to be used under these circumstances is to be charged on the scale applicable to lighting.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations, &c., Vacant.

CHIEF DISTRIBUTING ENGINEER. Oriental Gas Company. Applications to London Office by Aug. 17.
MANAGER AND SECRETARY. Shepton Mallet Gas-Works. Applications by Aug. 7.
ASSISTANT OUTDOOR SUPERINTENDENT. No. 5121.

Situation Wanted.

GAS COMPANY'S OFFICE WORK OR SHOW ROOM, &c. No. 5118.
ENGINEER WITH EXPERIENCE IN RETORT ERECTION. No. 5119.
SECRETARY, MANAGER, OR ACCOUNTANT. No. 5115.

Plant, &c. (Second-Hand), for Sale.

BOILERS, ENGINE, AND WASHER. Dorchester Gas Works.
PURIFIER, EXHAUSTER AND STEAM ENGINE, GASHOLDERS, &c. Kirkintilloch Gas Department.

Plant, &c. (Second-Hand), Wanted.

GASHOLDER, BALANCE WEIGHTS, AND GUIDE PULLEYS. No. 5120.

Meetings.

BRENTFORD GAS COMPANY. St. Ermin's Hotel, Aug. 6, 2.30 o'clock.
BROMLEY AND CRAYS GAS COMPANY. Offices, Aug. 12, Six o'clock.
CHICHESTER GAS COMPANY. Offices, Aug. 23. One o'clock.
ENFIELD GAS COMPANY. Offices, Aug. 26, 5.30 o'clock.
HORNSEY GAS COMPANY. Offices, Aug. 20, 3.30 o'clock.
IRISH ASSOCIATION OF GAS MANAGERS. Dolphin Hotel, Dublin, Aug. 10.
SOUTHGATE GAS COMPANY. London Office, Aug. 19, 3.45 o'clock.

TENDERS FOR

Coal and Cannel.
BRADFORD GAS DEPARTMENT. Tenders by Aug. 26.

Lamps and Incandescent Burners.
CALCUTTA CORPORATION. Tenders to Messrs. Mansfield and Sons, Liverpool.

Meters.
DEWSBURY GAS DEPARTMENT. Tenders by Aug. 11.

Pipes, &c.
DEWSBURY GAS DEPARTMENT. Tenders by Aug. 11.

Sulphuric Acid.
DEWSBURY GAS DEPARTMENT. Tenders by Aug. 11.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
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See Advertisement on p. 285.
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Offices: City Chambers, LEEDS.
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APPLY TO THE
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Telephone: 341 AVENUE.

D. ANDERSON AND COMPANY,
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18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

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Apply, THOMAS HORROCKS
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AMMONIACAL Liquor wanted. Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs. Telegrams: "Chemicals."

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For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought.
J. Wilson, Pleasant Grove, York Road, King's Cross, London, N.

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See Advertisement, June 22, p. VI. of Centre.
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SPECIALLY prepared for Sulphate of AMMONIA Makers by
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It is also used for the enrichment of Gas.
Manufactured and supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agent, F. J. Nicol, Pilgrim House, Newcastle-on-Tyne.
Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

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GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

PATENTS AND TRADE MARKS PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

IRISH ASSOCIATION of GAS MANAGERS.

THE

ANNUAL MEETING

Of the Association

WILL BE HELD IN THE

DOLPHIN HOTEL, ESSEX STREET, DUBLIN,

ON TUESDAY, AUG. 10, 1909.

The Chair to be taken at 11.30 a.m. by the President, Mr. F. T. EUSTACE, Tullamore.

Business: Report of Committee; Admission of New Members; Election of Office Bearers; President's Address; Reading of Papers, &c.

PAPERS TO BE READ.

1. "Experience with a Small Sulphate Plant," by Mr. G. Saville, Drogheda.
2. "Some Notes and Queries on the Control of Small Gas Undertakings," by Mr. J. E. Enright, Tralee.

LECTURE.

"Inverted Incandescent Lights," by Mr. Henry O'Connor, Assoc.M.Inst.C.E., F.R.S.E., of Edinburgh.

By invitation of the President, Light Refreshment will be partaken of about 2 o'clock.

For the following day, an Excursion has been arranged; the party taking train to Bray, whence a drive will be taken through Rocky Valley, Powerscourt, Enniskerry, and Dargle.

Geo. Airth,
Pro Hon. Secretary.

Dundalk, July 24, 1909.

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PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
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APPLICATIONS for Appointments arranged effectively. Greatly appreciated by Recipients. Numerous unsolicited Testimonials. Write Now for Particulars.
Herbert Greatorex, Birchover, Matlock.

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Leadburner, 117, Gallaway Road, Shepherd's Bush, London.

MR. WM. CRANFIELD, F.C.S., in re- sponse to requests, has decided to extend the work he has been carrying on by Gas Classes in various Yorkshire Towns for the past Ten Years, and to organize postal courses of Tuition in "Gas Engineering" and "Gas Supply." Close personal attention will be given to the needs of each individual Student, and Expert Assistance has been engaged. All Inquiries treated confidentially.
Full Particulars on Application to No. 11, Avondale Place, Halifax.

MR. W. B. MIMMACK, for many years Secretary, Manager, and Accountant of the Crays Gas Company (111 Millions), now in Amalgamation, seeks APPOINTMENT in any or all of these Offices.
Address No. 5115, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ADVERTISER (Aged 35), of Good Ad- dress, requires APPOINTMENT. Having General Knowledge of Routine in Gas Company's Office, Hire Department, Meter Taking, &c., or in Show-Room of Gas Company or Fittings House. Good Credentials.
Address No. 5118, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ENGINEER, with Experience in Retort Erection, both Horizontal and Vertical, in England and Abroad, seeks an ENGAGEMENT where his Constructional Skill would be of Advantage.
Address No. 5114, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

CHIEF DISTRIBUTING ENGINEER.

THE Directors of the Oriental Gas Com- pany are about to appoint a CHIEF DISTRIBUTING ENGINEER, to have the Entire Charge of the Company's Mains, Services, and all Matters connected with the Distribution of the Gas in Calcutta and Howrah.

He must have had mature Practical Experience of all his Duties, and have a Thorough Knowledge of Mainlaying, and be competent to Design a Scheme for the Supply of considerable areas.

He will be required to Enter into an Agreement with the Company for a Term of Years, and to proceed to India at an Early date.

Age not to exceed 40 Years.

Salary, £600 to £800, according to Qualifications.

All Particulars obtainable from the Secretary of the Company, Finsbury House, Blomfield Street, E.C.

Applications for the Appointment must be sent to the Secretary not later than the 17th of August.

WANTED—A Manager and Secretary for Gas-Works with an Annual Make of 13 Millions. Must be thoroughly Conversant with all Branches of the Work and Accounts.
Applications, stating Age, Experience, and Salary required, together with References, to be sent to the Chairman, Gas-Works, Shepton Mallet, Somerset, before Aug. 7, 1909.

ASSISTANT OUTDOOR SUPERINTENDENT.
WANTED, a Young Man, well up in General Gas-Fitting, able to ADVISE on all Matters connected with Uses of Gas, prepare Estimates, and make himself generally useful.
Apply by letter, stating Age, previous Experience, and Salary required, to No. 5121, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

PURIFIERS—Set of Four, 12 feet Square, fixed complete, £300. A bargain. Also Four 6 feet Square, Two 8 feet, Four 8 feet, and Two 12 feet square PURIFIERS. Cheap.
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Firth Blakeley's, Thornhill, Dewsbury.

WASHERS and Scrubbers — Two "Livesey" WASHERS. One "Clapham" WASHER. TOWER-SCRUBBERS, 3 ft. 6 in. by 16 ft., 4 ft. by 16 ft., and 7 ft. diameter by 55 ft. high. Sold at Bargains, being overstocked.
Firth Blakeley's, Thornhill, Dewsbury.

CONDENSERS—Clapham's, also Cutler's Water-Tube CONDENSERS. Pipe CONDENSERS, 4-inch to 10-inch diameter. Annular CONDENSERS, 8-inch, 10-inch, and 12-inch. Erected Complete and Cheap.
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WANTED, 6 to 7 Tons of Gasholder BALANCE WEIGHTS; also suitable GUIDE-PULLEYS.
Price and Particulars to No. 5120, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

FOR SALE—Two Cornish Boilers, 10 ft. 9 in. by 4 ft. 9 in., including some Mountings, in good Condition. Insured for 60 lbs. working pressure. One Vertical TABLE ENGINE, 4-H.P. by Cockey and Sons; also a Cockey's HORIZONTAL WASHER, for 250,000 feet per diem. Being removed for extensions.
Frank Osmond, Gas-Works, Dorchester.

BURGH OF KIRKINTILLOCH.
(Gas Department.)

THE above Council have for Disposal the following SECOND-HAND PLANT; and are prepared to receive Offers for same.

One PURIFIER, water-lute type, 20 feet by 10 feet, with Three Valves and Connections.

One Laidlaw EXHAUSTER and STEAM-ENGINE combined on one Bed-Plate, with Valves, Bye-Pass Compensator, and Steam Governor; maximum capacity, 10,000 cubic feet per hour.

One small Single-Lift GASHOLDER; capacity, 12,500 cubic feet.

One Double-Lift GASHOLDER; capacity, 95,000 cubic feet.

Further Information may be had from the undersigned.

James Bell,
Engineer and Manager.

Gas-Works, Kirkintilloch.

CITY OF BRADFORD.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Bradford Corporation are prepared to receive TENDERS for the Supply of Best GAS COAL, COBBLES, NUTS, and CANNEL, all to be well Screened, Dressed, and free from Shale and Pyrites, to be delivered at the several works of the Corporation during the Period of One Year, commencing on the 1st day of October next.

Form of Tender, with any further Information required, may be had on Application to Mr. Chas. Wood, Gas Engineer, Town Hall.

Sealed Tenders, endorsed "Tender for Coal," to be sent to me on or before Thursday, the 26th of August next.

The Contracts will be let subject to the Fair Contracts Clauses of the Corporation, which may be seen at the Town Clerk's Office, and which the accepted Contractors will be required to sign.

The lowest or any Tender will not necessarily be accepted.

Frederick Stevens,
Town Clerk.

Town Hall, Bradford,
July 28, 1909.

BOROUGH OF DEWSBURY.

THE Gas Committee of the above Corporation invite TENDERS for the Supply and Delivery, during the period ending the 31st day of July, 1910, of:—

(1) SULPHURIC ACID.
(2) WET and DRY METERS.
(3) CAST-IRON GAS AND WATER PIPES.

Specifications and Forms of Tender may be obtained on Application to the Gas Manager (Mr. Geo. Wm. Fligg), Gas-Works, Savile Town, Dewsbury.

Tenders, under sealed cover, endorsed "Sulphuric Acid," "Meters," or "Cast-Iron Pipes," as the case may be, to be sent to me not later than the 11th day of August.

The Corporation do not bind themselves to accept the lowest or any Tender.

H. ELLIS,
Town Clerk.

Town Hall, Dewsbury.

CORPORATION OF CALCUTTA.

PUBLIC LIGHTING.

THE Corporation of Calcutta are prepared to receive TENDERS for the Supply of:—
3000 COPPER STREET LANTERNS, and
9000 INCANDESCENT BURNERS for Street Lanterns,
to be supplied about the end of the year 1910.

The Street Lanterns must be designed for a Tropical Climate, and be, as far as possible, Wind, Dust, and Insect proof.

The Incandescent Burners may be either inverted or Upright and of various sizes giving a light of from 25 to 90 Candle Power. They should be Insect proof.

Inquiries in first instance must be addressed to MANSFIELD AND SONS, LIMITED, Gas Engineers, Derby Square, James Street, LIVERPOOL, who will forward Selected Designs to Calcutta for the Approval of the Corporation.

The lowest or any other Tender will not necessarily be accepted.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

BRENTFORD GAS COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors will be held at the St. Ermin's Hotel, Caxton Street, Westminster, on Friday, the 6th of August next, at Half-past Two o'clock, to transact the usual Business, including the declaration of a Dividend for the Half Year ending the 30th of June last.

By order,
WILLIAM MANN,
Secretary.

Office, Brentford,
July 20, 1909.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Offices of the Company, No. 63, Chancery Lane, in the County of London, on Friday, the 20th day of August, 1909, at Half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th of June last; to declare Dividends; and to transact the Business of an Ordinary General Meeting.

The TRANSFER BOOKS WILL BE CLOSED from the 6th to the 20th of August, 1909, both days inclusive.

By order of the Board,
WILLIAM E. ROBERTS,
Secretary.

Offices: 63, Chancery Lane,
London, W.C., Aug. 3, 1909.

ENFIELD GAS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Offices of the Company, Sydney Road, Enfield, on Thursday, the 26th day of August prox., at Five-Thirty o'clock in the Afternoon precisely, to receive the report of the Directors and the accounts of the Company for the half year ended the 30th of June last; to declare a Dividend; and to Transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 13th to the 26th of August, both inclusive.

By order,
CHAS. W. OFFORD,
Secretary and General Manager.

Enfield, July 28, 1909.

CITY OF CHICHESTER GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Proprietors of the above Company will be held at the Offices of the Company, at the Gas-Works, Chichester, on Monday, the 23rd day of August, 1909, at One o'clock in the Afternoon precisely, to receive the report of the Directors and the accounts for the half year ended the 30th of June, 1909; to declare a Dividend; and to Transact the General Business of the Company.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 9th to the 23rd inst. inclusive.

By order of the Board,
VICTOR V. VICK,
Secretary.

Offices: Gas-Works, Chichester,
July 27, 1909.

BROMLEY AND CRAYS GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held on Thursday, the 12th day of August, 1909, at Six o'clock p.m. precisely, and on this occasion at the Company's Offices, 156, High Street, Bromley, Kent, to receive the Report of the Directors; the Balance-Sheet certified by the Auditors; to declare a Dividend; and to Transact generally the Business of a General Meeting.

The TRANSFER BOOKS WILL BE CLOSED from the 29th of July to the 12th of August, 1909, both days inclusive.

By order of the Board.
HENRY W. AMOS,
Secretary.

Offices: 156, High Street,
Bromley, Kent, July 27, 1909.

SOUTHGATE AND DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Company will be held at the Company's Offices, No. 5, Great Winchester Street, Old Broad Street, in the City of London, on Thursday, the 19th day of August inst., at 3.45 o'clock p.m. precisely, to receive the Report of the Directors and the Accounts of the Company for the half year ended the 30th of June, 1909; to declare Dividends; to elect an Auditor; and for other purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 6th to the 19th of August, both days inclusive.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Office, 5, Great Winchester Street,
Old Broad Street, London, E.C.,
Aug. 3, 1909.

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[See Illustrated Advertisement, July 13, p. 142.]

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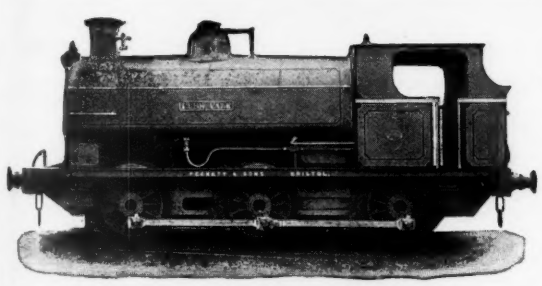

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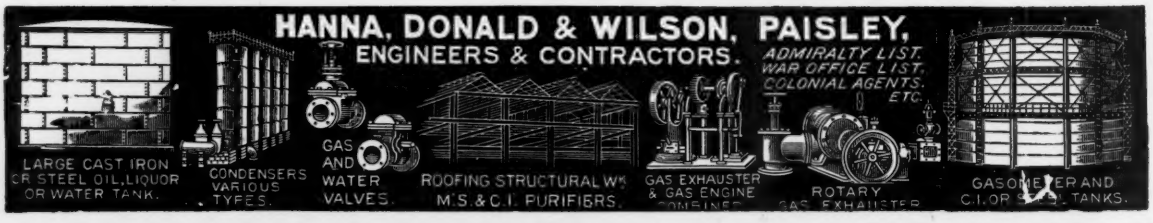
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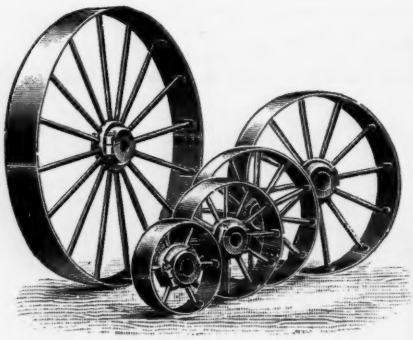

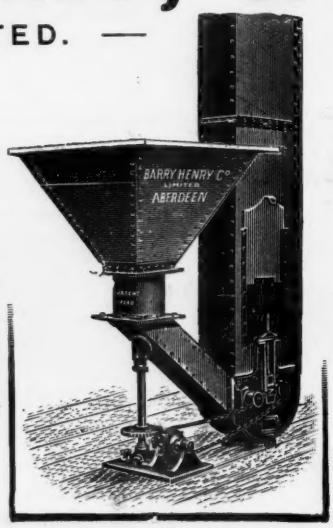

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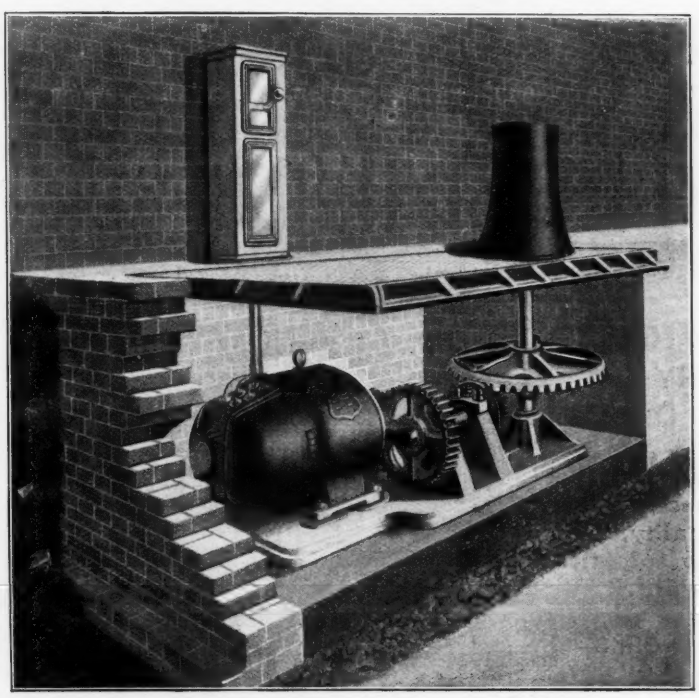
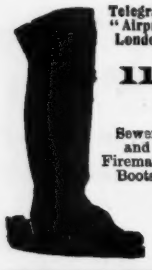


Sole Makers of **The D.B. Patent HOT COKE CONVEYORS,** and **Jenkins De Brouwer Patent STOKING MACHINES** also Makers of **TELPHER CONVEYING PLANTS,** and all kinds of **GAS-WORKS MACHINERY.**

Electric Haulage Capstan.

BEEHIVE WORKS, RETFORD, NOTTS., ENGLAND.



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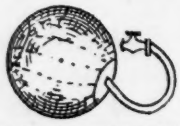
Largest Manufacturers of Gas Main Bags.

Sewer and Fireman's Boots.



Gas Bags for repairing Mains. All Seams Stitched and Taped.

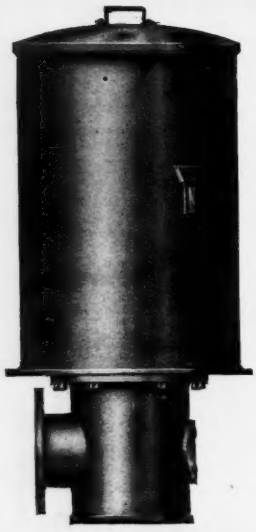
Patentees of the DENMAR BAG,

Impervious to Main Liquor and Climatic Influences.

Oilskin Clothing, Diving and Wading Dresses, Sewer Boots, Tar Hose, Stokers' Mitts, Bellows, &c.

Gas Bags for repairing Mains. All Seams Stitched and Taped.

Contractors' and Mine Jackets.



RETORT HOUSE GOVERNORS.

THESE Governors are made to prevent fluctuation in the Pressure of Exhaust in the Hydraulic Main by controlling the Gas entering the Governor, notwithstanding the constant varying quantity of Gas coming from the Retorts. This enables the Seal of the Dip Pipes to be reduced to a minimum with perfect safety, and an increase in the make of Gas per Ton of Coal is thereby assured.

There is absolutely no possibility of any sticking, due to deposits of Tar or Pitch, with this Governor, as the Cone is quite free to pass through the Seat. The Regulation by means of a long Parabolic Cone is recognized as the most exact method that can be employed. A great improvement, first introduced by Messrs. JAMES MILNE & SON, LIMITED, is the simple arrangement by which a smaller Cone and Seat can be easily fitted, thus ensuring delicate adjustment during a period of small makes.

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R. LAIDLAW & SON (EDINBURGH), LTD.

GAS METER MAKERS.

DRY METERS
IN
TIN AND IRON CASES.

WET METERS
IN
TIN AND IRON CASES
WITH ORDINARY AND
COMPENSATING DRUMS.

All Materials used in the Manufacture of these Meters are of the best quality, and the Workmanship of the Highest Standard.

SIMON SQUARE WORKS
EDINBURGH.
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LONDON, E.C.

Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

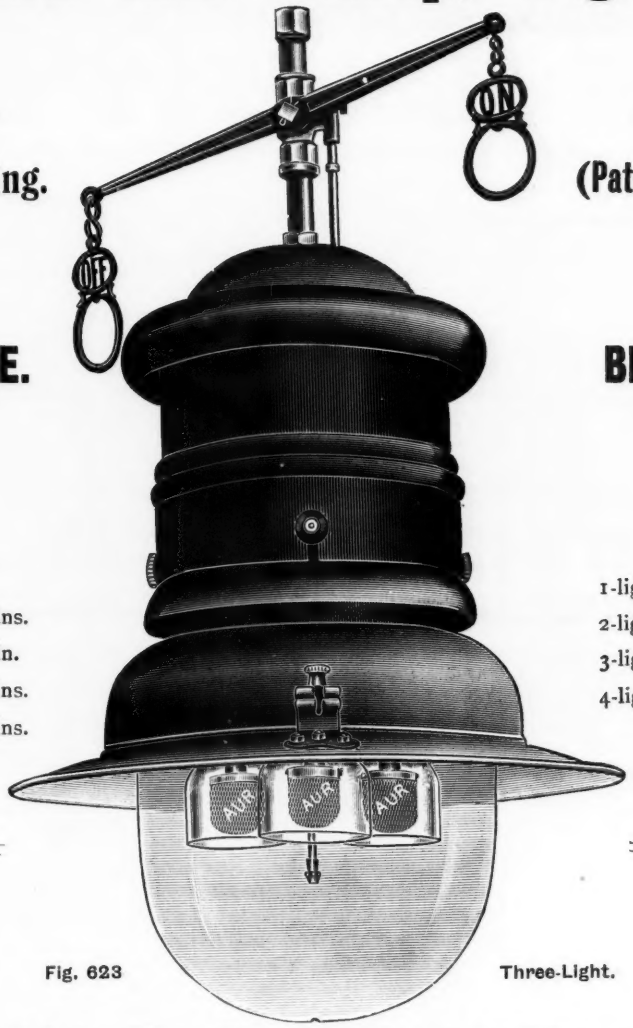

Fig. 623 Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 1 in.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 4 ins.
3-light . . .	1 ft. 6 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.
3-light	12 feet	400	**52/6**	**6/-** extra.
4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**4/-**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**42/9**	**57/9**	**93/-**
Case contains . .	*80*	*48*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

THE WELSBACH INCANDESCENT GAS LIGHT CO., LTD.,
Welsbach House, 344-354, Gray's Inn Road, London, W.C.
Telegrams and Cables: "WELSBACH LONDON." *Telephone 2410 NORTH.*

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CARBONIZATION MADE EASY.

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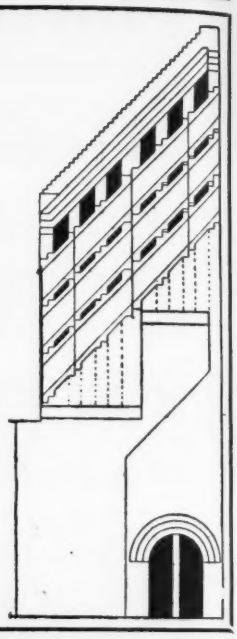
Carbonizing charges **40 per cent. less** than with Horizontals.
No skilled Stokers necessary.
Yield of Gas per ton guaranteed about 1000 cubic feet more than under present conditions, of guaranteed candle power,
Heats under absolute control throughout the whole length of the Retorts.
Saleable value of Coke greatly increased.
25 per cent. greater yield of Ammonia.
More liquid Tar.
Stopped Pipes unknown.
Naphthalene always in solution.
45 per cent. less ground space required.
Constructional cost per Ton carbonized considerably less than with Horizontal or Ordinary Inclined Retorts.
Several Installations in course of construction or completed.



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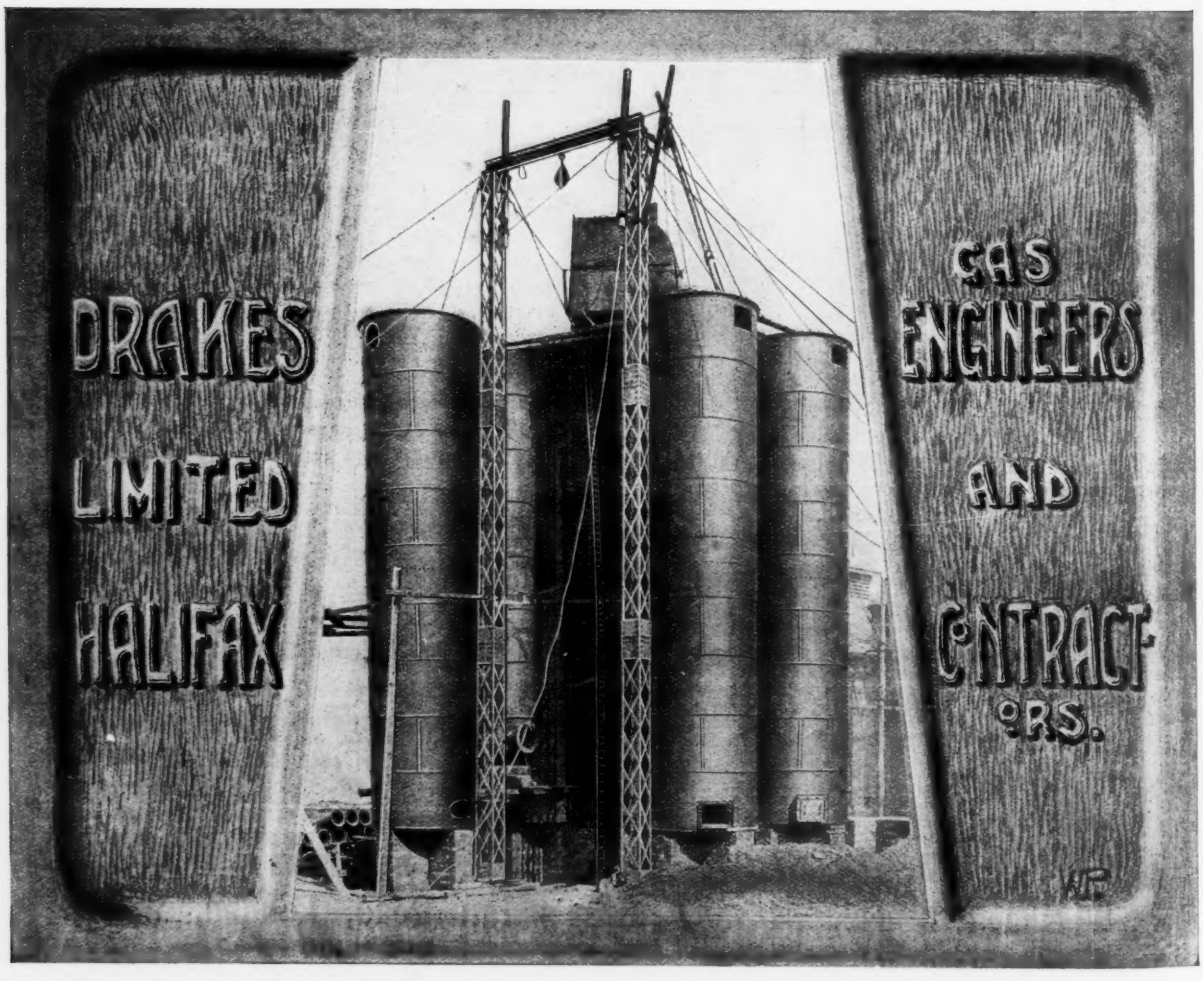

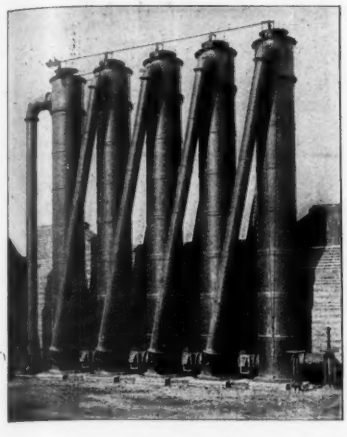

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WATER **Condensers** AIR

GAS PLANT OF EVERY DESCRIPTION DESIGNED AND ERECTED.

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MAXIMUM EFFICIENCY GUARANTEED.

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LIGHT OILS VAPORIZED.

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PLANTS

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HIGH PRESSURE GAS.

Rotary Compressor driven by direct coupled Gas-Engine on one base.

Made in various sizes for High Pressure Lighting or Boosting District Mains, &c., and arranged for any Pressure up to 5 lbs. per square inch.

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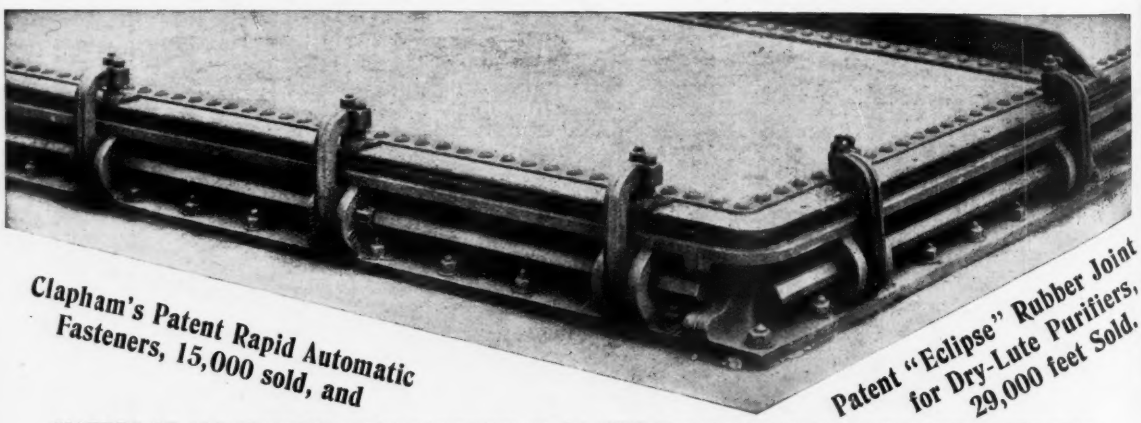

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